

# AA AUTOMOTIVE INDUSTRIES

**AUTOMOTIVE and AVIATION MANUFACTURING  
ENGINEERING • PRODUCTION • MANAGEMENT**

**DECEMBER 1, 1955**

## ***In This Issue***

Checker Cab's New Taxi-Passenger Car Models  
Comparative Power and Torque of 1956 Engines  
New Studebaker Trucks, Hudson and Rambler Cars  
Automatic Engine Assembly at Plymouth Plant  
Ford's New Engine and Stamping Facilities  
Industrialization Attempts in Red China

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**A CHILTON PUBLICATION**

# **Bremen Bearings, Inc., uses SUPERLA Soluble Oil to give bearings the clean, cool treatment**

PRECISION NEEDLE BEARINGS are the exclusive product of Bremen Bearings, Inc., Bremen, Indiana. SUPERLA Soluble Oil is used exclusively in all eight of the Company's Cincinnati Centerless Grinders. Plant management experimented with various soluble oils before settling on SUPERLA. They found none could compare with SUPERLA Soluble Oil with respect to wheel loading, stability and tool machine cleanliness.

Plus these benefits, Bremen found


SUPERLA mixed readily with water regardless of degree of hardness. The Company found, too, that they got longer tool life and maximum rust protection of work and machines.

You will have the same experience with SUPERLA Soluble Oil. Find out. Inquire of your Standard Oil lubrication specialist. In the Midwest call your nearby Standard Oil office. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Ill.



**STANDARD OIL COMPANY (Indiana)**

Franklin D. Clark (right), Sales Manager, Bremen Bearings, Inc., and Standard Oil lubrication specialist E. A. Hunt, inspect needle bearing. Gene Hunt is well qualified to assist industrial plants on lubrication problems. In addition to his three years' experience in industrial lubrication sales work, Gene has an M. E. degree from Purdue and has completed the Standard Oil Sales Engineering School. Customers find this experience and training pay off for them.



Bearings being ejected from Cincinnati Centerless Grinder at Bremen Bearings, Inc. The Company manufactures needle bearings to customers' specifications in sizes from 1/16 to 1/2 inch with tolerances of .0001" and finishes to 3 micro-inches. SUPERLA Soluble Oil is used on all of the Company's grinders.



For dependable power transmission  
under constant, heavy load...



## COTTA TRANSMISSIONS

serve you better, longer!

Here's the kind of work Cotta Transmissions are made for: rugged, heavy loads... variable torque conditions... dependable operation required!

This 35 ton Coal Recovery Drill, manufactured by The Salem Tool Company, Salem, Ohio, bores 42" dia. holes into the highwall... breaks up the coal and delivers it to the conveyor at a rate of 400 to 500 tons a day. A mobile power unit rotates the auger and thrusts it 200 feet into the vein. Cotta's Model G2U Heavy-Duty

Transmission provides a reduction in both forward and reverse speeds... meets extreme torque conditions... takes heavy, intermittent shock loads *in stride!*

If you have an application on heavy equipment... cranes, locomotives, drillers, shovels, etc... with input torque from 150 to 2000 foot pounds, Cotta standard or "engineered-to-order" Power Transmissions will serve you better, longer... give you outstanding performance at low cost!

### THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions and complete specifications sent free on request. Just state your problem—COTTA engineers will help you select the right unit for best performance. May we work with you?

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS



# COTTA

HEAVY-DUTY  
TRANSMISSIONS

"Engineered-to-order"



**Passenger Model** Mercedes cars have adopted nickel cast iron brake drum liners because of the notable successes of Mercedes-Benz "Silver Arrow" racing cars so equipped in rigorous trials such as the Le Mans 24-Hour Road Race.

## Nickel cast iron lines brakes of new 240 hp Mercedes 300 SL series cars

THIS RADIALLY FINNED brake drum for the new Mercedes model 300 SL embodies an Al-Fin bonded friction liner of nickel cast iron.

Fortified with nickel, the liner not only resists uneven wear from thermally induced stresses, but it also dissipates intense frictional heat from internal surfaces through the aluminum to the air, thus preventing "brake fade." In addition, it resists warpage.

And particularly important, in spite of irregular but rigorous cycles of heating and cooling, it resists heat-checking.

Life expectancy of cast iron parts

can be materially increased by adding suitable amounts of nickel to properly adjusted base mixtures. In this way you improve structure, mechanical strength, thermal expansion characteristics and stability at elevated temperatures.

Nickel alloys have answered exacting demands throughout the automotive and allied industries. Whatever your metal difficulty, let us give you the benefit of our wide practical experience in this field.

Write for List A of available publications. It includes a simple form that makes it easy for you to outline your problem.



The friction liner of this Mark II type radially finned brake drum contains 0.80-1.00% nickel along with molybdenum and chromium. Ferrous liners are bonded into the cast aluminum drums by the Al-Fin process, a development of the Al-Fin Div., Fairchild Engine and Airplane Corp., Deer Park, N. Y.



**THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street  
New York 5, N.Y.

# AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE PUBLISHED SEMI-MONTHLY

DECEMBER 1, 1955

VOL. 113, NO. 11

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MEMBER



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Spurgeon Automation Unit on the test floor of the Spurgeon Company at Van Dyke, Mich. Note the vital points where Cleveland units are installed—a small unit (20AT) driving the feed mechanism and two 70HD units, one at each end of the elevator lift.

## Spurgeon automation unit employs three CLEVELANDS

**I**N a Detroit automotive plant, three Spurgeon units automatically elevate, transfer and feed steel bars into bar cut-off machines. Top production is gained and hours of man power and money are saved by automation.

Three Cleveland Worm Gear Speed Reducers are employed on each Spurgeon unit: Two vertical reducers on the mechanical drive that operates the elevator; a third Cleveland on the "V" Roll Conveyor pushes the rods into the bar cut-off machine.

Automation and Cleveland Worm Gear Speed Reducers go hand-in-hand. Precision matching of case-hardened steel worms to nickel-bronze gears insures 100% dependability. And, the compact, right-angle Cleveland design saves space and makes installation easy.

Find out what Cleveland can do for your operations before you buy. Catalog 400 gives the story. The Cleveland Worm and Gear Co., 3274 E. 80th St., Cleveland 4, O.

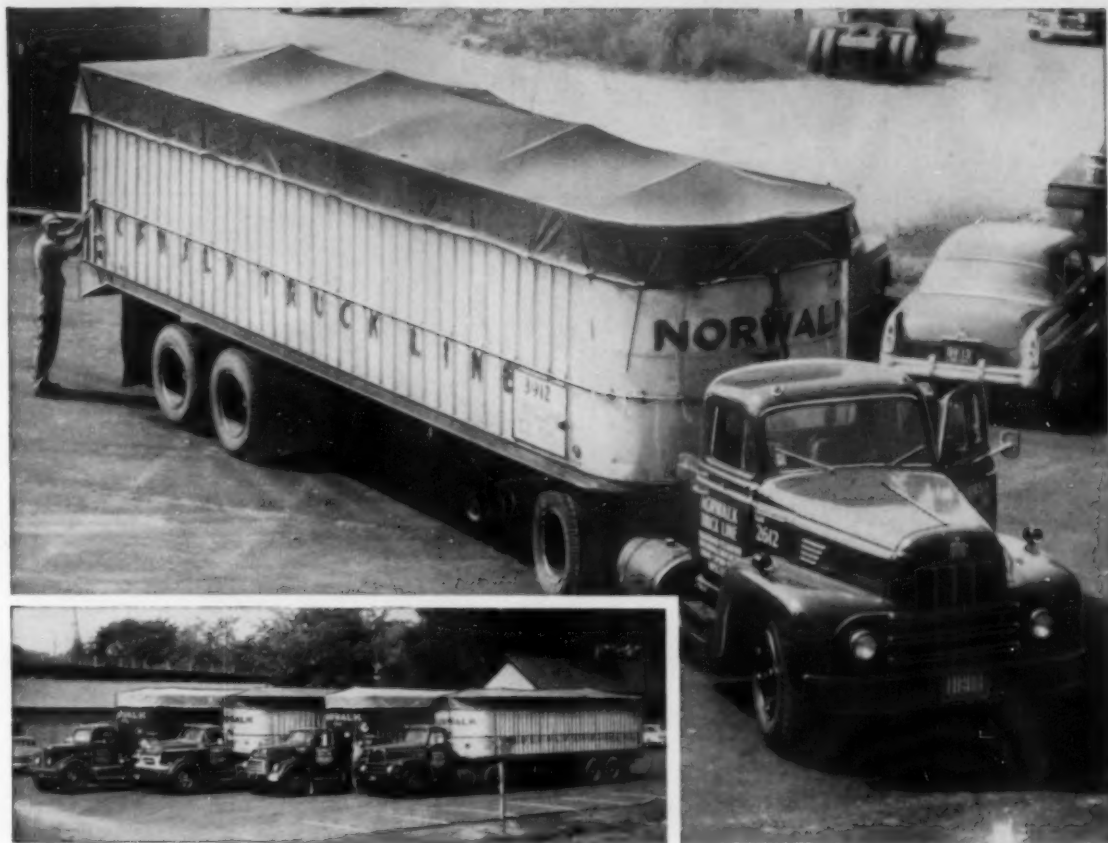
*Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.*



**CLEVELAND**  
Worm Gear  
*Speed Reducers*

Another new development using

# B. F. Goodrich Chemical raw materials



*B. F. Goodrich Chemical Company does not make these tarpaulins. We supply only the Geon vinyl resin.*

## Lighter Tarp is tops with truckers

"MAKE it light," said truckers, "and you'll solve one of our big tarpaulin problems."

Conventional tarpaulins for open top trucks are heavy, hard to manage and not completely weatherproof. A manufacturer familiar with the versatile properties of Geon polyvinyl materials knew the answer to this problem. He coated tough nylon fabric with a plastisol based on Geon paste resin and produced a lighter, weather resistant tarpaulin that also resists the effects of grease, oil and mildew. No sewing is necessary—it's all electronically sealed.

Color is another bonus for the trucker. The Geon coating in bright colors reflects oncoming headlights for greater safety in night driving. It is also translucent, allowing daylight loading without artificial light.

This Geon coated tarpaulin may give you an idea for a new product, or increase the sales appeal of a present one. Geon materials cover a wide range of profitable uses from wire insulation to rigid pipe, foam, flooring, and many others. To find out more about specific advantages that Geon may offer your own operation,

please write Dept. CA-6, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.



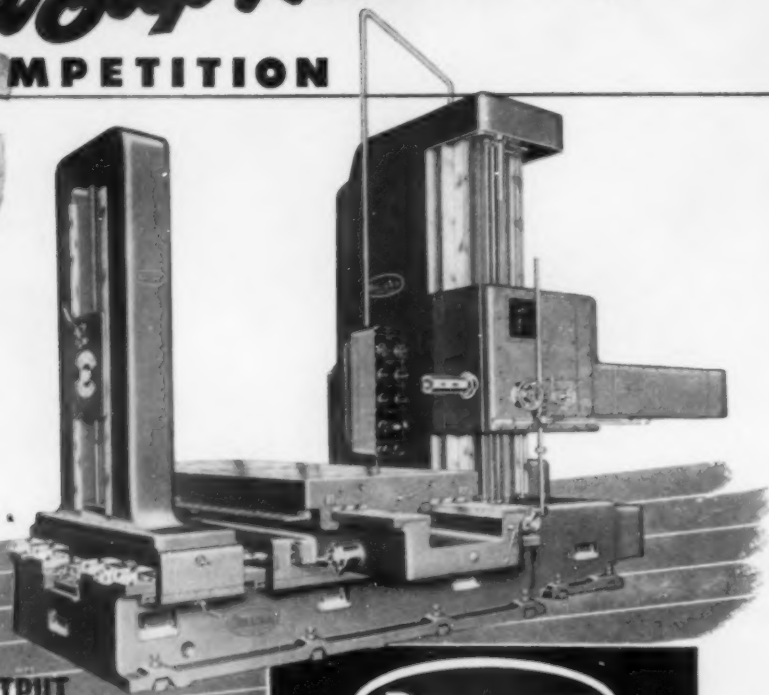
**GEON RESINS • GOOD-RITE PLASTICIZERS**... the ideal team to make products easier, better and more saleable.

**GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors**

**KEEP YOUR PRODUCT**

# *a Step Ahead of* **COMPETITION**

**THROUGH  
LOWER COSTS ...  
INCREASE  
EFFICIENCY ...  
GREATER  
PRODUCTION OUTPUT ...**



Unless your present equipment is as modern as the Bullard Horizontal Boring, Milling and Drilling Machine, Model 75, you are not employing all of today's engineering achievements to your manufacturing methods.

You owe it to yourself to investigate the many advantages to be gained by

using the Bullard Horizontal Boring, Milling and Drilling Machine, Model 75 in your plant.

**BULLARD**

**HORIZONTAL BORING, MILLING  
AND DRILLING MACHINE**

*Model 75*

#### HERE ARE SOME OF ITS FEATURES:

**PENDANT CONTROL** — complete machine control from a movable pendant station. Feed and speed rate selection, directional feed and traverse engagement of the spindle, head, table and saddle, spindle rotation and operation of head binders are accomplished from the Pendant.

**BOTH SCREW AND RACK FEED** — to the spindle provide smooth, steady screw feed for boring and sensitive hand feed for small drilling and tapping.

**SPEED RANGES** — 9.5 to 2032 R.P.M. on 3", 7 to 1510

R.P.M. on 4" standard and 5.8 to 1209 R.P.M. on 4" heavy duty and 3" sizes, meets any machining requirement.

**RIGIDITY** — is built into the massive 4-Way Bed, Head, Headpost and Rear Post assuring a higher degree of maintained accuracy.

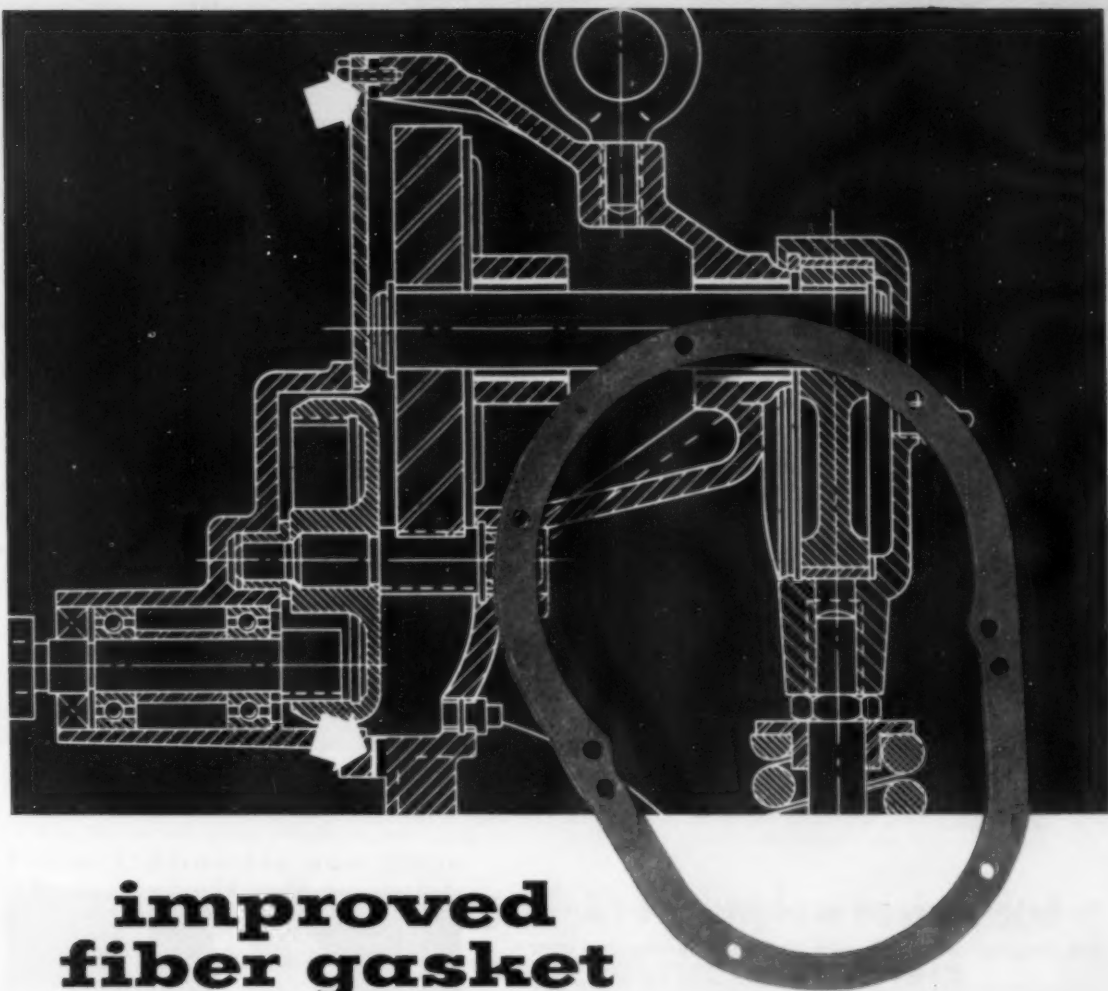
**OPTICAL MEASURING EQUIPMENT** — for head and table (optional)

**AUTOMATIC POSITIONING** — for head and table (optional)

FOR COMPLETE INFORMATION WRITE FOR CATALOG HBM-75 OR CALL YOUR  
NEAREST BULLARD SALES OFFICE OR DISTRIBUTOR.

**THE BULLARD COMPANY**

**B R I D G E P O R T 2 , C O N N E C T I C U T**



## improved fiber gasket

**withstands concentrated load, stops gear-case leakage**

After a short time in the field, the self-priming diaphragm pumps made by a mid-western manufacturer started losing oil. The trouble was traced to the gear-case housing gaskets, which were being squeezed out of joints because narrow flanges concentrated the bolt pressure.

The oil leaks stopped, however, when Armstrong CN-705 Accopac® was used in place of the original gasket material. Because Accopac is unusually compressible and crush resistant, it maintained a perfect seal on the narrow flange. This compressibility also means that Accopac conforms to the normal irregularities in stamped flanges—as well as to those found in rough-milled flange surfaces.

Accopac won't shrink or dry out, either. It's made by a patented beater-saturation process which blends

fiber and cork with a non-volatile, non-extractable latex binder. The resultant sheets are uniform, dimensionally stable, and impervious at bolting pressures as low as 800 psi.

For information on how Accopac can help in specific gasketing applications, call your Armstrong man.

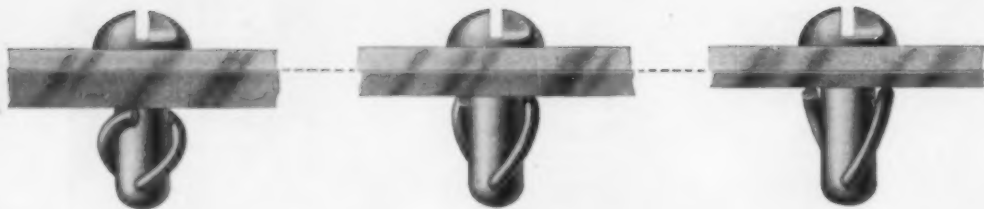
**FREE 24-PAGE GASKET MANUAL—** Look for "Armstrong Gasket Materials" in Sweet's product design file . . . or write for your own copy to Armstrong Cork Company, Industrial Division, 7012 Imperial Avenue, Lancaster, Pennsylvania. **And be sure to specify Armstrong Gasket Materials when you order from your gasket cutter.**



# Armstrong Accopac

... used wherever performance counts

# This fastener works through thick and thin!



Spring-Lock—the easy-to-use removable fastener for modern designs—works whether panel thicknesses run over or under specifications! Spring wire deflects automatically to handle greater or lesser thicknesses. Spring-Lock's design flexibility makes it more than a fastener: it can be adapted as a shelf support, door strike, knob or any similar panel-mounted device. Many standard shapes and sizes of Simmons Spring-Locks are available from stock.

**SIMMONS FASTENER CORPORATION**

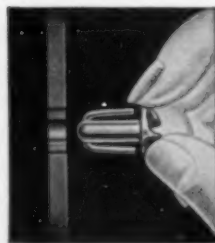
1749 North Broadway, Albany 1, New York

## Simmons

QUICK-LOCK  
SPRING-LOCK  
ROTO-LOCK  
LINK-LOCK  
DUAL-LOCK

JUST OUT!  
NEW 36-PAGE CATALOG WITH APPLICATIONS  
SEND FOR IT!

### HERE'S HOW SPRING-LOCK WORKS



1. Insert fastener.



2. Half-turn locks it in place.

With production costs on the uptrend, you can figure on Spring-Lock as an assembly time and money-saver, because:

- Installation is **BLIND**
- Installation is **EASY**: no special tools are needed
- Installation is **QUICK**: a half-turn locks it in place
- Installation is **SECURE**: the *spring steel* locks the fastener, resists vibration

Send for details and samples, or write us about your fastening problem.

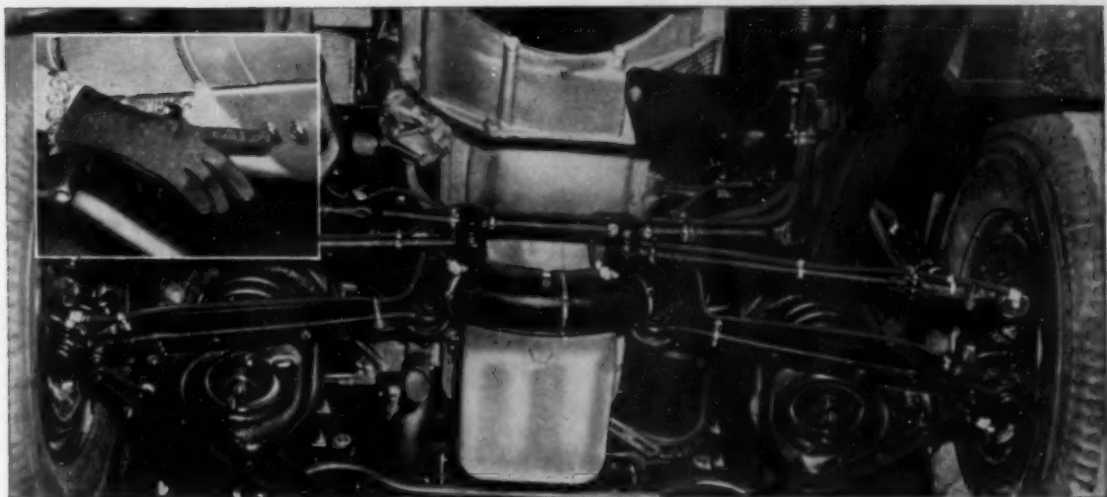


Better Things for Better Living  
... Through Chemistry

## AUTOMOTIVE ENGINEERING

PROPERTY AND APPLICATION DATA ON THESE  
VERSATILE ENGINEERING MATERIALS: "ZYTEL,"  
"ALATHON," "TEFLON," "LUCITE."

# NEWS



A MERE PRESS OF THE DASHBOARD BUTTON activates a master lubrication cylinder. This forces a premeasured amount of specially compounded lubricating grease through tubing of "Zytel" nylon resin to each bearing. Available on both Lincoln and

Mercury automobiles, this self-contained lubrication system assures proper lubrication of all points equipped with grease fittings. (Tubing of "Zytel" nylon resin is fabricated by The Polymer Corp. of Reading, Pa., under the trade-mark "Nylaflex.")

## Rugged, flexible tubing of ZYTEL® nylon resin used throughout new power lubrication system

Newest addition to power accessories for passenger cars is the Multi-Luber, a development of the Lincoln Engineering Co., of St. Louis, Missouri.

The system consists of a control button on the instrument panel and an injector pump located in the engine compartment. Tough, flexible lines of "Zytel" nylon resin extend from the pump to 12 key points on chassis, suspension and steering systems.

**Lubrication in seconds . . . A touch**

of the control button admits vacuum from the intake manifold to the injector pump starting the lubrication cycle. In a few seconds lubrication is completed from a 7-oz. disposable can of lubricant supplying the system. The Multi-Luber provides 225 chassis lubrications before it is necessary to replace the can.

**High burst strength required . . .** The network of feed lines must necessarily meet rigid specifications. They are 1/8"

O.D. x 0.080" I.D. and can withstand a burst pressure of approximately 2,500 p.s.i. (Under normal conditions injection pressure is about 2,000 p.s.i. at the bearing ports.)

Rigid road tests proved how well "Zytel" withstands heat, cold and flexing—how impervious it is to oil, grease, and gasoline. Lincoln Engineering found that the lightness in weight of "Zytel" nylon resin was another important advantage that determined its selection for this application.

### NEED MORE INFORMATION?

The wide range of properties available with the DuPont engineering materials — "Zytel," "Lucite," "Teflon" and "Alathon" — are helping solve many industrial design problems. Clip and mail the coupon for complete property and application data.

E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department  
Room 1712, Du Pont Building, Wilmington 98, Delaware  
In Canada: Du Pont Company of Canada Limited, P. O. Box 560, Montreal, Quebec.

Please send me more information on the Du Pont engineering materials checked: ☐ "Zytel"® nylon resin; ☐ "Lucite"® acrylic resin; ☐ "Teflon"® tetrafluoroethylene resin; ☐ "Alathon"® polyethylene resin. I am interested in evaluating these materials

for \_\_\_\_\_  
NAME \_\_\_\_\_  
POSITION \_\_\_\_\_  
COMPANY \_\_\_\_\_  
STREET \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_  
TYPE OF BUSINESS \_\_\_\_\_

"Zytel," "Lucite," "Teflon" and "Alathon" are registered trade marks of E. I. du Pont de Nemours & Co. (Inc.)

# NOW!

**a multi-cycle  
single point  
production  
lathe**

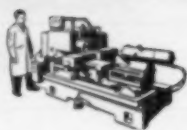
**...designed for quick  
set-ups to handle small lots**

This Sundstrand 40 HP single point turning lathe provides a ruff and semi-finish cut with ruffing tool and finish cut with finishing tool *all in one automatic cycle*. This is a mechanically operated machine with front carriage and shoulder facing tools actuated independently. Three cuts, as described, can be taken on each of 8 diameters at 4 different speeds in one automatic cycle. No template is required for step turning, and



50 YEARS OF  
**"Engineered  
Production  
Service"**  
REG. U.S. PAT. OFF.

AUTOMATIC LATHES



SIMPLEX RIGIDMILS



DUPLEX RIGIDMILS



micrometer adjustment for steps is easy to set for size corrections due to material changes, etc. There is no lost motion for re-set because index takes place during cut.

Machine is provided with a transmission type head with automatic speed changes to maintain correct speeds and maximum horsepower. Feeds are infinitely variable, from  $7\frac{1}{2}$  to 300 inches per minute.

## ✓ Check these 7 important advantages

- 1 Easy tool maintenance.
- 2 No matching of cuts.
- 3 Fast set-up.
- 4 Uniform stock removal for subsequent grinding or finishing operations.
- 5 Ruff and finish automatic cycle for possible elimination of green grinding.
- 6 No waiting for special tooling to complete small lots.
- 7 No tooling inventory for small lot runs.

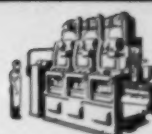
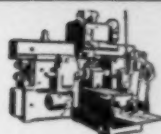
## Additional Data . . . . .

. . . on both types of machines is available. Write for copies today. Ask for bulletin 262.



TRIPLEX RIGIDMILS

SPECIAL MACHINES



AUTOMOTIVE INDUSTRIES, December 1, 1955



also available with  
**PUNCH CARD**  
control

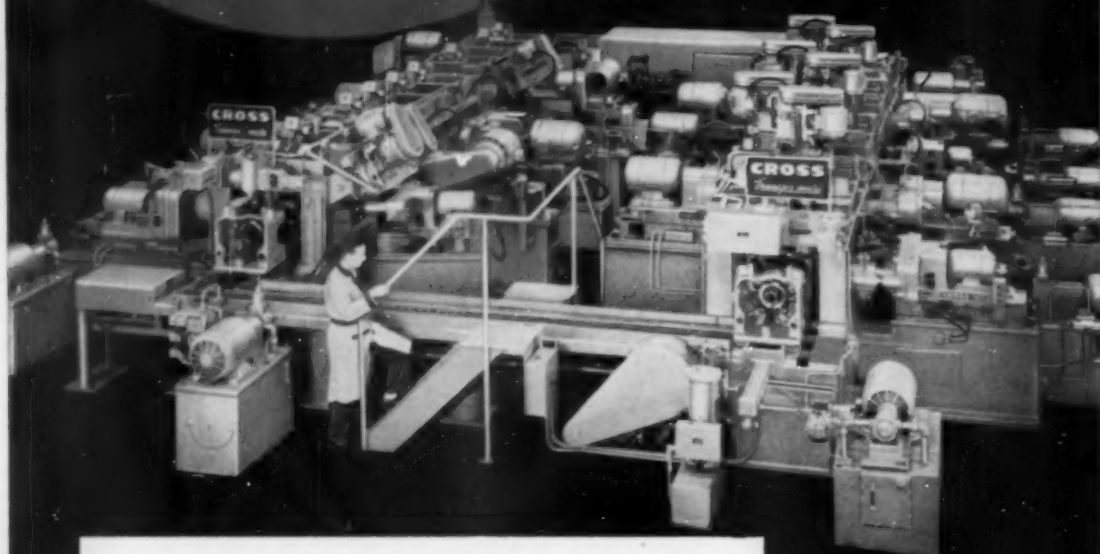
This same machine can be furnished with punch card control. With this system, decimal dimensions on engineering drawings are punched in standard business machine cards with a standard key punch. The cards are then fed into a reader, as shown above, which feeds the electrical signals into a machine control unit. This unit then controls all functions of the machine.

# SUNDSTRAND Machine Tool Co.

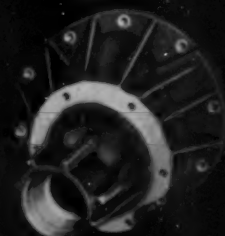
2571 Eleventh St. • Rockford, Ill., U.S.A.

# Mills, Drills, Bores, Turns Differential Gear Carriers

*Another Transfer-matic by Cross*



- ★ Rough and semi-finish bores pinion bores and cross bores; rough and finish faces and turns pilot diameter of torque tube flange; mills faces of cross bore bosses; spotfaces flange mounting holes; drills, chamfers, reams and taps all other holes except flange holes.
- ★ 115 pieces per hour at 100% efficiency.
- ★ 73 operations: 8 milling, 8 boring, 2 crossfacing, 1 turning, 18 drilling, 10 spottfacing, 7 chamfering, 2 reaming, 9 tapping, 8 probing.
- ★ Complete interchangeability of all standard and special parts for easy maintenance.
- ★ Palletized work holding fixtures with hydraulically operated torque wrenches for clamping and unclamping parts.
- ★ Washing and drying unit for cleaning fixtures between last cutting station and loading station.
- ★ Other features: Construction to J.I.C. standards; hardened and ground ways; hydraulic feed and rapid traverse; automatic lubrication system.



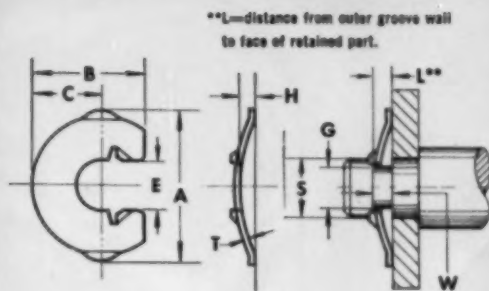
Established 1898

THE **CROSS** CO.  
DETROIT 7, MICHIGAN  
*Special* MACHINE TOOLS

# New Waldes Truarc locking-prong ring functions as spring, shoulder, fastener...and STAYS PUT!



Above assembly shows how 2 Waldes Truarc Locking-Prong Rings (Series 5139) replaced 6 parts...eliminated threading operation... and need for skilled labor.



WALDES TRUARC LOCKING-PRONG RING (Series 5139)  
U. S. Pat. Pending

Ring No. 5139-	SHAFT		RING DIMENSIONS										average ultimate shear strength lbs.	GROOVE DIMENSIONS					resilient end play take up L max. L min.			
	Dia. S	tol.	A	tol.	B	tol.	C	tol.	E	tol.	H	tol.		T <sup>†</sup>	tol. <sup>†</sup>	Dia. G	tol.	Width W		tol.	L min.	L max.
12	.125	±.002	.340	±.010	.307	±.010	.166	±.005	.086	±.004	.050	±.010	.010	±.0013	400	.082	±.0015	.045	±.005	.035	.045	.010
★15	.156	±.003	.380	±.010	.330	±.010	.184	±.005	.108	±.004	.055	±.010	.010	±.0013	600	.104	±.002	.050	±.005	.035	.045	.010
18	.188	±.003	.445	±.010	.390	±.010	.213	±.005	.130	±.005	.060	±.010	.015	±.0015	900	.124	±.002	.065	±.005	.045	.055	.010
25	.250	±.003	.581	±.010	.500	±.010	.280	±.005	.172	±.005	.070	±.010	.015	±.0015	1000	.165	±.002	.070	±.005	.050	.065	.015
31	.312	±.003	.744	±.010	.620	±.010	.360	±.005	.234	±.005	.095	±.010	.018	±.0015	1300	.228	±.003	.080	±.005	.080	.095	.015
★37	.375	±.003	.853	±.015	.740	±.010	.427	±.005	.280	±.005	.130	±.010	.020	±.002	1900	.270	±.003	.105	±.005	.090	.115	.025
★43	.438	±.003	.960	±.020	.820	±.020	.475	±.010	.327	±.010	.130	±.010	.025	±.002	2200	.327	±.003	.105	±.005	.095	.120	.025

Additional Sizes Under Development

★Production does not available as of date of printing

†Applies to unplated rings only

\*Recommended safety factor = 3 to 4.

The Waldes Truarc Locking-Prong Retaining Ring is a new, low cost, radially applied fastener which can be locked positively in its groove and used as a shoulder against rotating parts. It is primarily intended for use in the automotive, electronic and aeronautical industries.

This radially applied ring locks positively in its grooves by means of two prongs at the open end. Because of its high thrust-load capacity the Waldes Truarc Locking-Prong Ring may be used as a shoulder against rotating parts. Its bowed construction provides for end-play take-up in the assembly and makes less critical the tolerances required for the parts being fastened. Since it serves as a spring as well as a shoulder, this ring eliminates the need for springs, washers, and other accessory fastening devices.

Whatever you make, there's a Waldes Truarc Retaining Ring

designed to improve your product...to save you material, machining and labor costs. They're quick and easy to assemble and disassemble, and they do a better job of holding parts together. Truarc rings are precision engineered and precision made, quality controlled from raw material to finished ring.

36 functionally different types...as many as 97 different sizes within a type...5 metal specifications and 14 different finishes. Truarc rings are available from 90 stocking points throughout the U. S. A. and Canada.

More than 30 engineering-minded factory representatives and 700 field men are available to you on call. Send us your blueprints today...let our Truarc engineers help you solve design, assembly and production problems...without obligation.



SEND FOR FREE SAMPLES  
**WALDES TRUARC**  
RETAINING RINGS

Waldes Kohnsner, Inc., 47-16 Astor Place, L.I.C. 1, N.Y.

☐ Please send me sample Locking-Prong Rings.  
(please specify shaft size)

☐ Please send me supplement No. 1 which brings Truarc Catalog RR 9-52 up to date.  
(Please print)

Name

Title

Company

Business Address

City

Zone

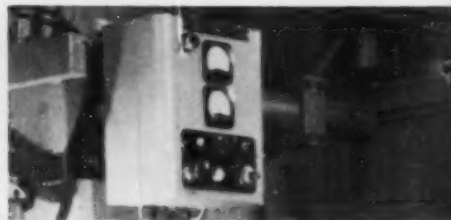
State

AS-127

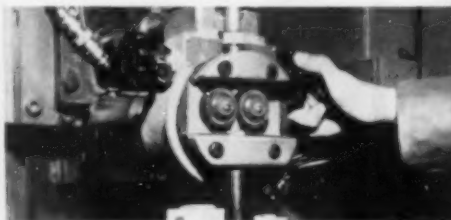
WALDES TRUARC Retaining Rings, Grooving Tools, Pliers, Applicators and Dispensers are protected by one or more of the following U. S. Patents: 2,382,948; 2,411,426; 2,411,761; 2,416,852; 2,420,921; 2,428,341; 2,439,785; 2,441,846; 2,455,165; 2,483,379; 2,483,380; 2,483,383; 2,487,802; 2,487,803; 2,491,304; 2,491,316; 2,509,081; 2,544,631; 2,546,616; 2,547,263; 2,558,704; 2,574,034; 2,577,319; 2,595,787, and other U. S. Patents pending. Equal patent protection established in foreign countries.

# NEW G-E Automatic Welding Equipment Matches Speed of Any Production Line

FILLERARC METHOD FEEDS FILLER WIRE AT ANY SPEED UP TO 1000 INCHES PER MINUTE



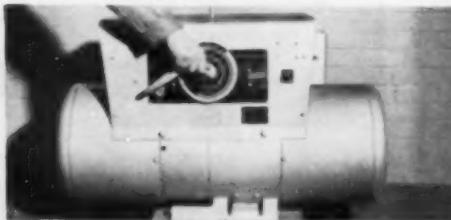
**WIDE RANGE OF WIRE SPEEDS**—up to 1000 inches per minute—makes this G-E system flexible enough for any production line. Speed is constant since system is insensitive to normal line-voltage changes.



**FLEXIBILITY OF FILLERARC SYSTEM** is also demonstrated by the automatic head. It rotates 360°, allowing even overhead welding. Arc is completely visible since gas instead of flux is used as the shield.



**CIRCULAR OR SEAM WELDS** may be made on stainless steel, copper, aluminum, and other metals—using inert gas. Fillerarc generator and carbon dioxide gas combine for low-cost, quality welds on mild steel.



**CONSISTENT WELD QUALITY** is a primary advantage of the G-E Fillerarc generator. It is self regulating and features a rising volt-amp curve which matches the arc curve—for reliable in-line operation.

For details, write for bulletin GEC-1334, Section 713-2, General Electric Co., Schenectady, N. Y., or call your G-E Welding Distributor.

GENERAL  ELECTRIC



**NATURALLY!**

*They're crammed into*

## SOFAS-ON-WHEELS!

Once it was luxury to overstuff automobiles with seating inspired by Grandma's parlor.

Today, it can be misery for motorists, dealers and you — because of lack of room for such seating AND customers.

One or the other must go — and AIRFOAM Development Engineers, working with foremost automobile makers, are helping keep the customers instead of the old-time upholstery!

New, complete seat-units of full-depth molded AIRFOAM dispense with over-bulky assemblies—and give the space saved to drivers and passengers. They also permit new production economies, while adding style, glamour and a better ride!

For more information—and significant case histories—contact Goodyear, Automotive Products Dept., Akron 16, Ohio.



AIRFOAM makes interiors roomier, more luxurious



Premolded AIRFOAM replaces expensive handwork—looks even richer



Exciting new seating ideas become practical with AIRFOAM



AIRFOAM can be your greatest sales-aid in years

# Airfoam

MADE ONLY BY

## GOOD YEAR

THE WORLD'S FINEST, MOST MODERN CUSHIONING



Airfoam—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



WYMAN-GORDON furnished the first heat treated crankshaft, forged the first six-throw crankshaft, forged the first eight-throw crankshaft, forged the first crankshaft with integral counterweights, and today forges a larger quantity and a greater variety of crankshafts than any other company in the world.

In a crankshaft there is no substitute for a forging, and in a forging there is no substitute for Wyman-Gordon quality and experience.

*Crankshaft forgings illustrated, left to right, for V-8 passenger car, diesel truck and heavy tractor engines*

## WYMAN-GORDON Co.

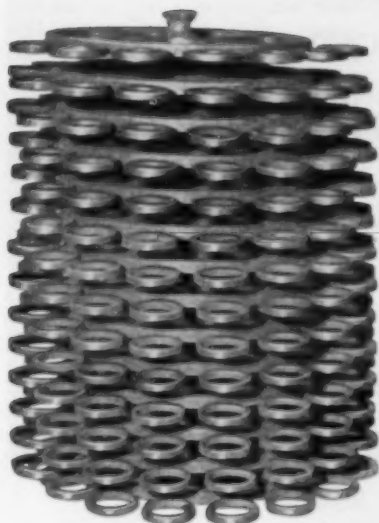
*Established 1881*

FORGINGS OF ALUMINUM • MAGNESIUM  
STEEL • TITANIUM

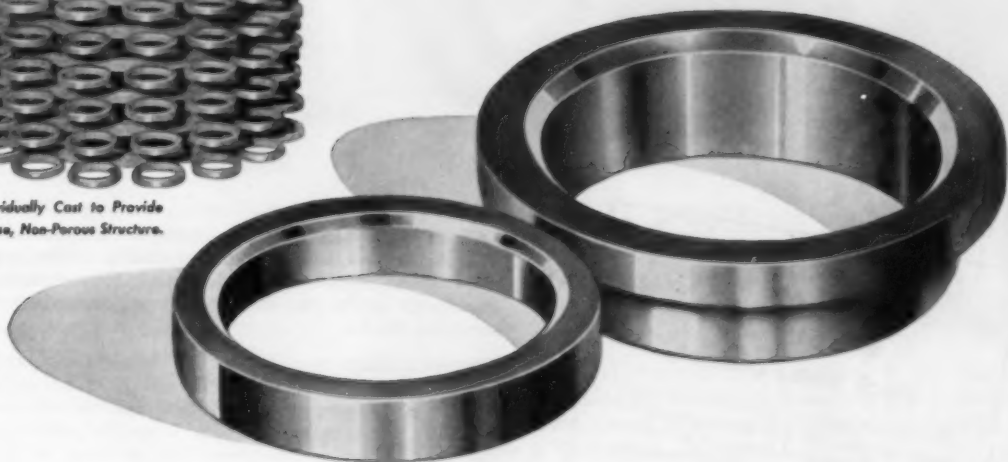
WORCESTER 1, MASSACHUSETTS  
HARVEY, ILL. • DETROIT, MICH.

# Solid Eatonite Valve Seat Inserts

**Heat Resistant  
Corrosion Resistant  
Wear Resistant**



Individually Cast to Provide  
Dense, Non-Porous Structure.



For engines in heavy-duty service, where high operating temperatures are encountered over extended periods of time, valve seat inserts cast in solid Eatonite pay for themselves many times over. The combination of Eatonite Valve Seat Inserts and Eatonite-Faced Valves virtually eliminates valve failure caused by prolonged operation at excessive temperatures, and maintains a high level of engine output. Available for all types of engines.

## EATON

**MANUFACTURING COMPANY**

General Offices: CLEVELAND, OHIO

SAGINAW DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN



**PRODUCTS:** Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

## MALLORY Electrical Contacts



... now protected  
from corrosion  
*by new plastic  
package*

### Save Time and Money with Standard Stock Silver Contacts

From an analysis of customer prints and usage records, Mallory has established a group of 70 standard designs of fine-silver headed rivet contacts. All of these are available for immediate shipment.

Designs cover a wide range of sizes, in both flat and radius-faced types. We invite you to use these standards as a "preferred list" for present and future specifications... to simplify your purchasing and inventory, and to eliminate the cost of special tooling. Write today for the folder which lists dimensions, part numbers and prices.

AS an extra value feature... without extra cost... Mallory contacts are now supplied in convenient polyethylene containers. Pliable and break-proof, these translucent jars let you check stock at a glance without removing the lid.

The new package protects contacts during storage and handling. The "self-locking" lid fits tightly... prevents leakage of moisture or corrosive atmospheres into the container. It not only puts an end to spilling problems, but also minimizes oxidation and sulfiding of the silver surfaces.

The containers are re-usable and need not be returned. You'll find them handy for storing any small parts that you use in assembly operations.

Modern packaging is only one of the convenience and economy advantages you gain through using Mallory contacts. Whether your needs are for standard or special types, Mallory can supply your requirements economically and promptly. For information, write or call Mallory today.

**Expect more... get more from**

P. R. MALLORY & CO. Inc.  
**MALLORY**

P. R. MALLORY & CO., INC., INDIANAPOLIS 6, INDIANA

#### Serving Industry with These Products:

Electromechanical—Resistors • Switches • Television Tuners • Vibrators  
Electrochemical—Capacitors • Rectifiers • Mercury Batteries  
Metallurgical—Contacts • Special Metals and Ceramics • Welding Materials

## Brown Thermocouple Protecting Tubes for Every Application

The protecting tube is just as important as the thermocouple with which it is used. It not only safeguards the couple from mechanical damage, but also extends its useful life and preserves its accuracy by preventing corrosion from the medium in which the couple is inserted.

You can be sure of getting the best protecting tube for your application when you choose from the extensive Brown line. Included are numerous types of metal and ceramic tubes, which cover any combination of temperature, atmosphere and mechanical conditions under which thermocouples are used. Large stocks insure quick deliveries.

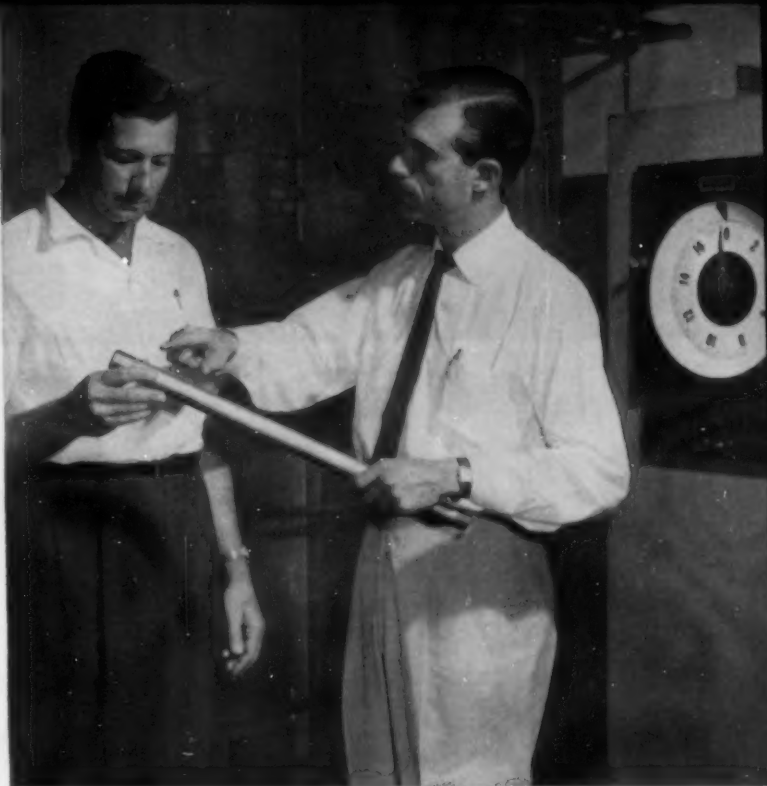


**Metal protecting tubes**, applicable to many heat-treating applications, are available in a choice of alloys . . . including carbon steel, cast iron, *Inconel*, nickel, *Resistat* (28% chrome iron), stainless steel and wrought iron. Maximum temperature service ranges from 1000 to 2200 F, depending on the alloy. All are manufactured to strict specifications.



**Ceramic protecting tubes** are generally used where temperatures exceed 2200 F. They are made from various specialized materials. Sillimanite, fused silica and Vycor are used as primary protecting tubes . . . with maximum temperature ratings of 3000, 2300, and 1800 F respectively. Many high-temperature installations require a secondary outer protecting tube, which can be firebrick, silicon carbide, or *Mullite* depending on the application.

Your local HSM will be glad to investigate the requirements of your specific installation, and to recommend the Brown protecting tube that will give you the best service.



*Here's why it pays  
to know your*



FRANK LONG, HSM (Honeywell Supplies Man) in the Houston area, points out advantages of Brown thermocouple protecting tubes to Travis Reese, at left, Supervisor of Tools and Supplies at the Cameron Iron Works, Inc., Houston.

The Honeywell Supplies Man can help you select proper pyrometer accessories. This is but one of the many extra values you get with the HSM Plan. Based on a survey of your plant requirements, this Plan establishes a long-range method of buying that simplifies your inventory, reduces paper work, and saves you money on all your pyrometer supplies purchases.

Find out for yourself how the HSM Plan can work for you . . . by calling your local Honeywell field office, as near to you as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR Co., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

● REFERENCE DATA: Write for Pyrometer Supplies Buyers' Guide No. 100-5.



MINNEAPOLIS  
**Honeywell**  
BROWN INSTRUMENTS

*First in Controls*

# NEW



When strategic aircraft requirements indicated a **NEW** type of universal joint, **MECHANICS** engineers developed it. Design, metals, machining, tolerances, heat-treating, hardening, stamina, balance and lubrication — all were adapted to specific aircraft precision. Let **MECHANICS** engineers design and build universal joints that are equally well suited to the exact power trans-

mission needs of your product. The competitive advantages that designed-for-the-job **MECHANICS** Roller Bearing **UNIVERSAL JOINTS** provide, are well worth investigating—while your new models still are on the drawing board.

**MECHANICS UNIVERSAL JOINT DIVISION**  
Borg-Warner 2024 Harrison Ave., Rockford, Ill.

# MECHANICS

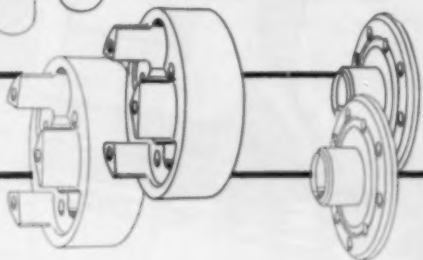
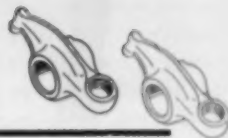
*Roller Bearing*



# UNIVERSAL JOINTS

For Cars • Trucks • Tractors • Farm Implements • Road Machinery •  
Aircraft • Tanks • Busses and Industrial Equipment

# If you want to be certain



## Laboratory Service

Whether you are designing new products or reviewing present production, Albion's Research and Development Laboratory facilities and competent engineering staff are ready to help you design better products that can be made at lower cost.



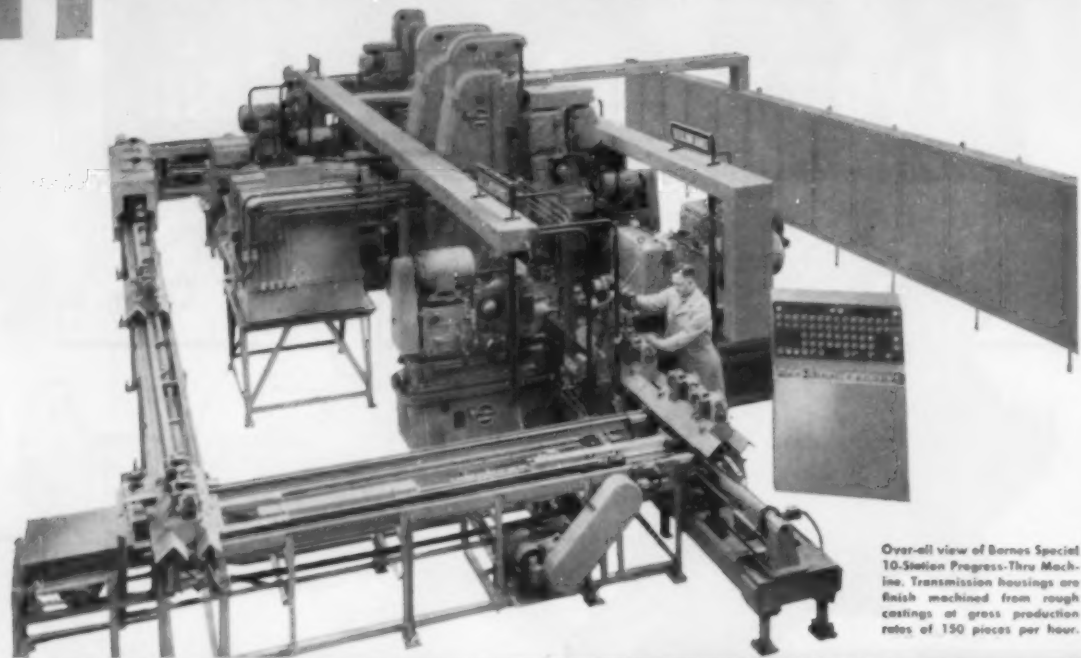
If you want pearlitic or ferritic malleable irons cast to your specifications—with physical properties to suit your specific range of application . . . if you desire the combined advantages of castability and high strength with greater freedom of design—and at lower cost, contact the Albion Malleable Iron Company now. They will be glad to bring you up-to-date on the rapid development in Albion's modern casting techniques which offer engineering advantages that are yours—if you want to be certain.

*Remember . . . there is no engineering substitute for good, accurate, dependable castings!*

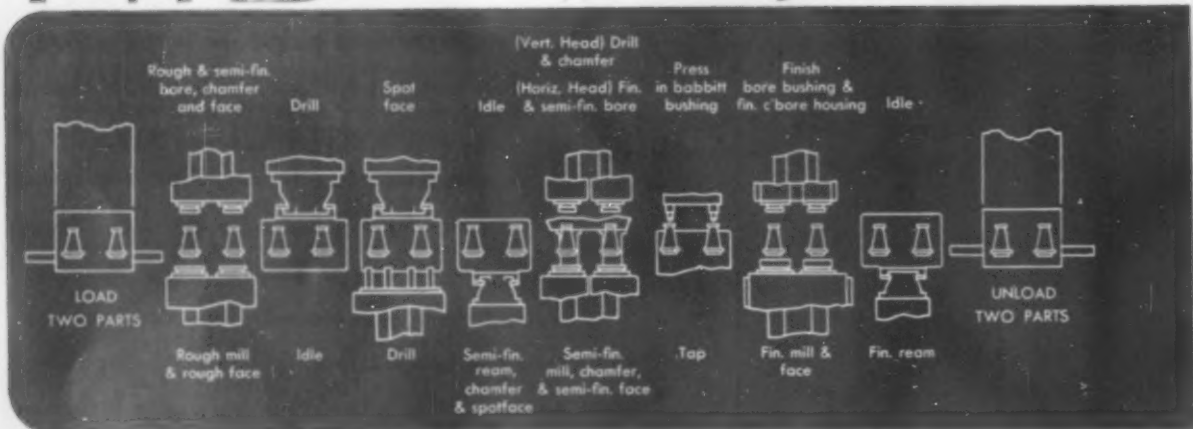
**ALBION MALLEABLE IRON CO.**  
ALBION, MICHIGAN

## TRANSMISSION EXTENSION

# HOUSINGS NOW MACHINED COMPLETE



Over-all view of Barnes Special 10-Station Progress-Thru Machine. Transmission housings are finish machined from rough castings at gross production rates of 150 pieces per hour.



*Builders of  
Better Machines  
Since 1872*

▲ Schematic drawing of machining operations. Total concentricity on all operations does not exceed .002". Housings are held in transfer plates which are located by two hydraulically actuated detents and clamped hydraulically at each machining station.



Special Machine Tools



Special Conveyor Units



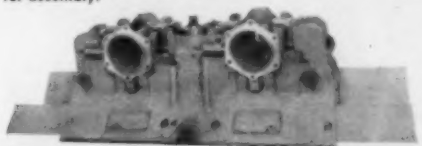
Special Process Equipment

MULTIPLE SPINDLE DRILLING • BORING • TAPPING MACHINES

# FROM ROUGH CASTING TO FINISHED PART



Transmission extension housings are finish machined in automatic cycle from rough casting to finished workpiece. After rapid washing and final inspection, the part is ready for assembly.



View of workpieces in special transfer plate fixture. Both housings are located and accurately positioned by means of dowels and screw-operated V-block clamps.

## W. F. & JOHN BARNES SPECIAL 10-STATION PROGRESS-THRU MACHINE

Here is another typical example of how W. F. & John Barnes Six-Point Machine Tool Building Service has helped increase production efficiency for a leading automobile manufacturer. All machining operations on transmission extension housings are now combined in one Special Barnes 10-Station Progress-Thru Machine at a production rate of 150 pieces per hour. Two operators, one at the loading end and the second at the unloading end, load and unload housings on transfer plates which carry workpieces through the entire machining cycle. Operations include boring, facing, milling, drilling, reaming, automatic press-in of babbitt bushings, and combination finish bore babbitt bushing and finish counterbore housing.

Whether your production requires large or small machines, you'll find the coordinated services at Barnes can help you solve problems quickly and efficiently.

## BARNES' COORDINATED 6-POINT MACHINE TOOL BUILDING SERVICE INCLUDES:

- 1 **SPECIALIZED MANUFACTURING FACILITIES**—75-year background, large well equipped plant efficiently tooling to build high production machines.
- 2 **SPECIAL HYDRAULIC EQUIPMENT**—designed and built to meet JIC standards. Individually engineered units assure smooth, dependable actuation for every requirement.
- 3 **SPECIAL ELECTRICAL EQUIPMENT AND CONTROLS**—individually designed and built for maximum safety and ease of control, with circuits that assure the most dependable coordination of all machine functions.
- 4 **SPECIAL GAUGES, FIXTURES, TOOLS**—designed for each individual machining problem, assure accuracy of operations at high production speeds.

- 5 **SPECIAL HANDLING AND CONVEYOR EQUIPMENT**—designed and built to reduce work handling, effect maximum safety and efficiency.

- 6 **COORDINATED DESIGN AND ENGINEERING**—Mechanical, Hydraulic, Electrical, Process, Tool, and Fixture Engineers work together at Barnes. Team-work solves complex problems quickly.

WRITE FOR  
FREE BOOKLET

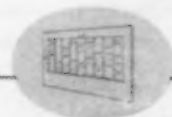
Ask for free booklet "Co-ordinated Machine Engineering" describing the scope of Barnes machine tool building service.



Closeup of station seven where babbitt bushings are automatically pressed-in to the small end of the housings. Bushings are hopper loaded by operator at the unloading station.

## W. F. & JOHN BARNES COMPANY MACHINE TOOL DIVISION

403 SOUTH WATER STREET, ROCKFORD, ILLINOIS



Special  
Electrical Controls



Food  
Machinery

## AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES



## 6 OUT OF 10 ARE GRANODIZED

Six out of 10 cars in this lot at Standard Pressed Steel, Jenkintown, Penna., are Granodized with Granodine® before painting. Why do most automobile manufacturers use this crystalline zinc phosphate undercoating? The reasons are simple. Granodine provides a lasting bond between paint and steel. It forms an inert barrier against rust. It assures a fine and durable paint finish.

Automobile manufacturers depend upon Granodizing

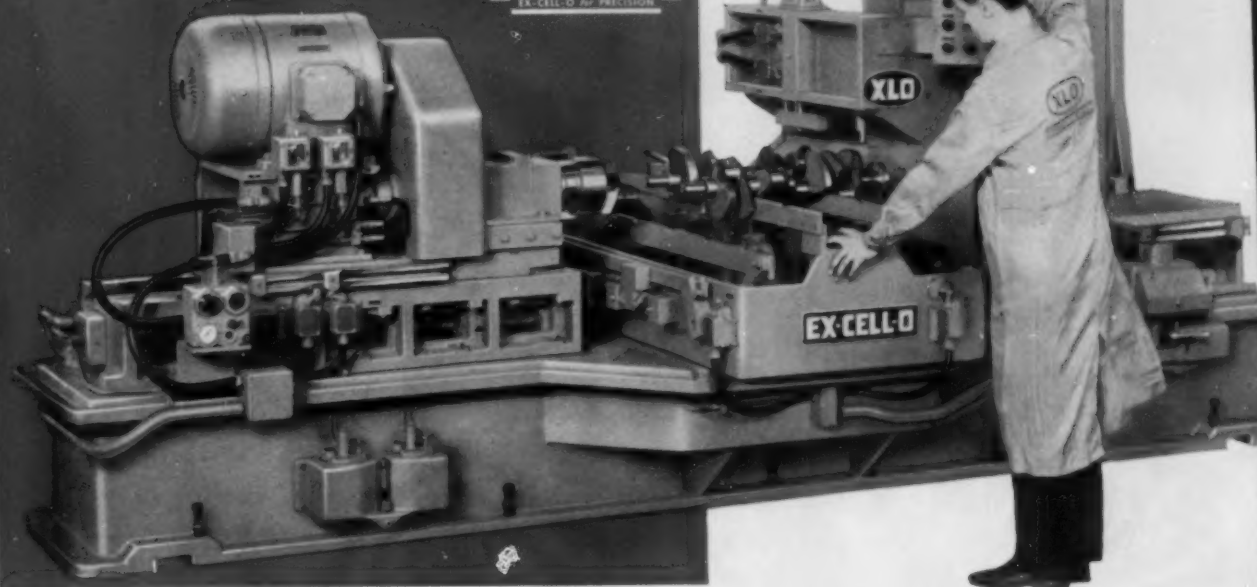
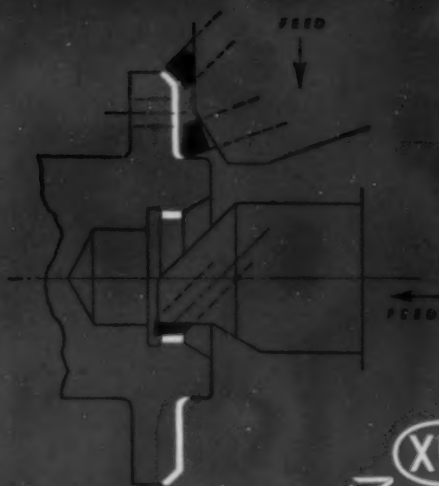
with Granodine, too, because of the technical assistance offered by ACP. Not only do we supply the chemicals — we also put them to work and, what's more, keep them working effectively.

Your sheet steel products also can have these extra sales features. Investigate the advantages of Granodizing with Granodine. Contact your nearest ACP sales office or write us.

**AMERICAN CHEMICAL PAINT COMPANY, Ambler 24, Pa.**  
 DETROIT, MICHIGAN      NILES, CALIFORNIA      WINDSOR, ONTARIO



Automotive Industries, December 1, 1955



On this Ex-Cell-O special Machine two standard, hydraulically operated slides are mounted on a base with a transfer type fixture between them. The left slide, which supports the spindles, advances, and hydraulically operated chucks grip and rotate the parts. Then the right slide carrying the tools advances. Crankshaft operations include precision boring a diameter within limits of  $\pm .0005''$ , holding the bore concentric with main bearings, facing a surface square with main bearings, and chamfering an edge. Surface cuts are indicated in white in diagram at left.

## EX-CELL-O Special Machine Bores, Faces 2 Crankshafts **SIMULTANEOUSLY**

What an improvement!

Automation equipment picks up two automotive crankshafts, places them in machining position, bores, faces and chamfers the flange ends simultaneously, and transfers them to the unloading position *all in one automatic cycle*. Building special purpose machines is an Ex-Cell-O forte. Manufacturers with problems in accuracy, production, and in combining numerous operations, look to Ex-Cell-O.

In return for this confidence Ex-Cell-O builds them special machines which quickly pay for themselves through substantial production in-

creases, improved quality, and reduced unit costs.

Whatever your plans for greater, more economical production, they can be materialized at Ex-Cell-O. Your Ex-Cell-O representative will be happy to discuss them with you.

## EX-CELL-O CORPORATION

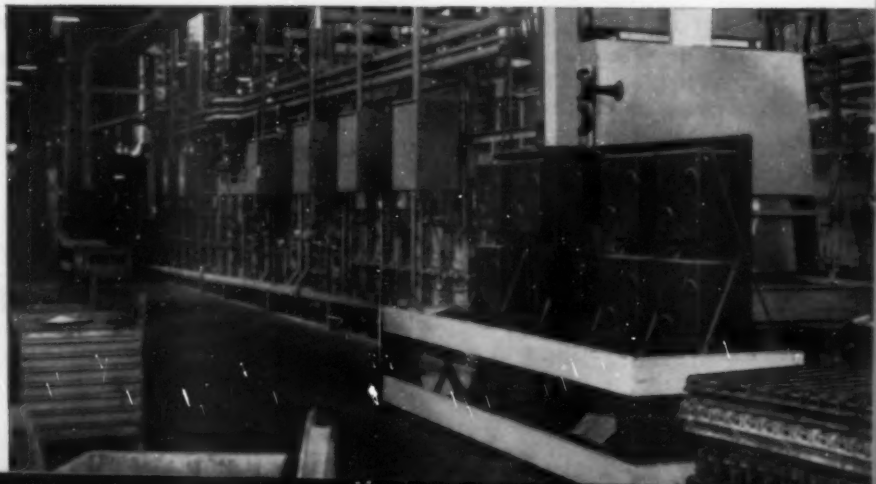
DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES  
CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS  
AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT



Caterpillar bulldozers speeded construction on the Banff Windermere Highway at Mount Eisenhower in Alberta, Canada.

One of six at Caterpillar, this Westinghouse cycle annealer treats metals in a controlled atmosphere to avoid scaling.





## Westinghouse annealers at Caterpillar® improve machinability

To insure quality products at competitive prices, Caterpillar Tractor Company is quick to study and test any new idea that might lead to reduced production costs and improved product performance. For instance, isothermal annealing of forgings before machining promised such results.

Installation of two Westinghouse cycle annealing furnaces demonstrated their value. Now Caterpillar uses six Westinghouse furnaces—some electric, some gas fired. Westinghouse tailored them to fit Caterpillar's precise needs.

These furnaces have proved they can produce the kind of microstructure allowing the highest rate of machinability and the desired finish. Here's another example of how Westinghouse engineers, working closely with the customer, help turn out a finer product at less cost. A call to your nearby Westinghouse Sales Engineer, The Man With The Facts, may produce heat-treating ideas for you, too.

J-10436

YOU CAN BE SURE...IF IT'S  
**Westinghouse**



**WESTINGHOUSE  
4-POINT SERVICE  
produces effective  
heat-treating**

- 1 Engineering consultation
- 2 Equipment design
- 3 Quality manufacturing
- 4 Packaged installation

Westinghouse Electric Corporation  
3 Gateway Center, P. O. Box 868  
Pittsburgh 30, Pa.

Please send me a free copy of the 40-page book, *Westinghouse Furnaces; Gas or Electric* (B-5459).

Name \_\_\_\_\_

Title \_\_\_\_\_

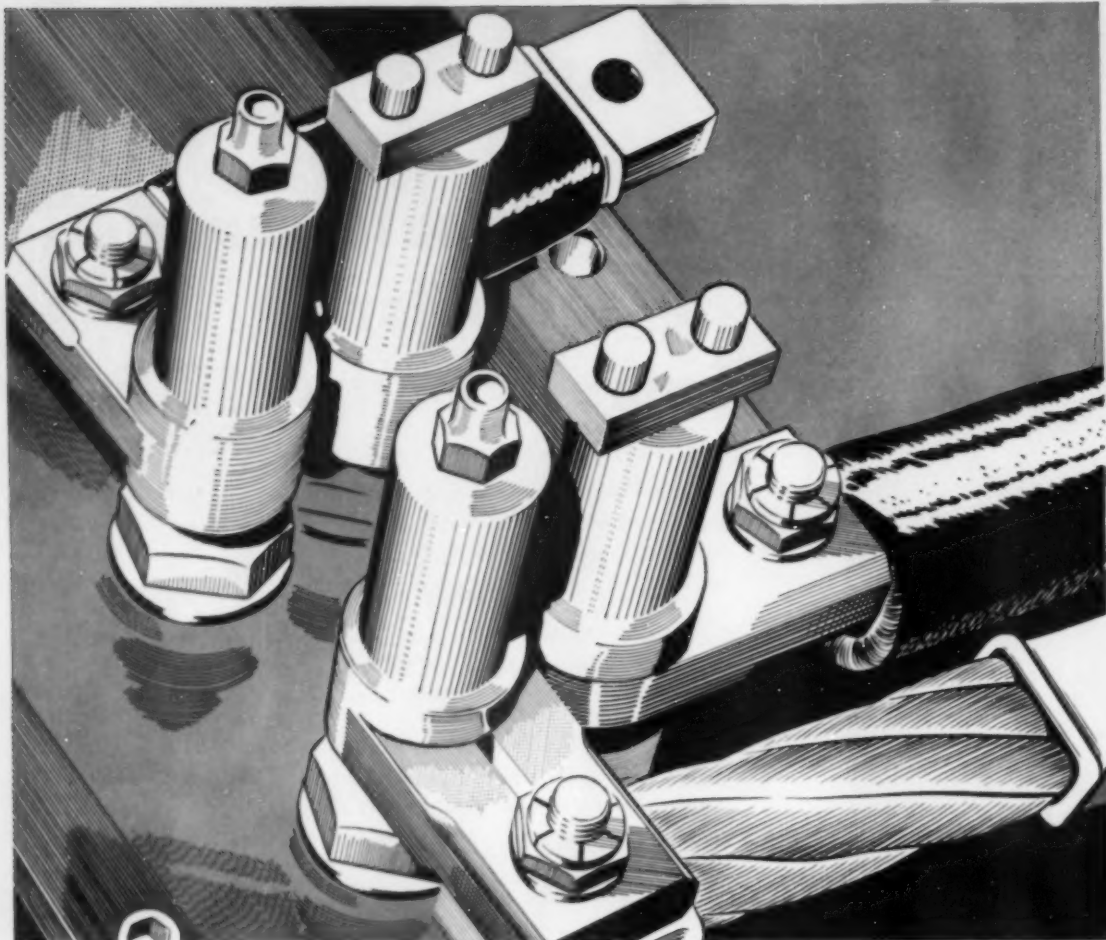
Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

## FLEXLOC AT WORK



**DESIGNER OF WELDING DIE** uses one-piece, all-metal thin FLEXLOCs as stop nuts on flexible cable assembly. Although the assembly swivels, FLEXLOCs won't work loose.

Nuts that loosen cause trouble. Contact is poor; flow of current erratic; welding faulty—and faulty welding means inferior finished jobs.

Don't take any chance of nuts loosening on vital assemblies. FLEXLOCs are made to stay put. And they are available in a wide range of sizes, types and material. See your authorized industrial distributor for Bulletin 866 and samples. Or write STANDARD PRESSED STEEL CO., Jenkintown 53, Pa.

### Use FLEXLOCs anywhere safely

**ON ROUGH BOLTS.** They'll smooth out bolt threads without damaging the threads of the nut.

**IN TEMPERATURES TO 550°F** in plated nuts and even higher in unplated ones. High temperatures do not affect FLEXLOCs. Nuts with non-metallic inserts fail under such conditions.

**AS STOP OR LOCK NUTS.** After at least  $1\frac{1}{2}$  threads of a standard bolt are past the top of the nut, the FLEXLOC stays put.

**REGARDLESS OF MOISTURE, OIL, DIRT OR GRIT.** None of these conditions make any difference to a FLEXLOC, and vibration won't loosen it.



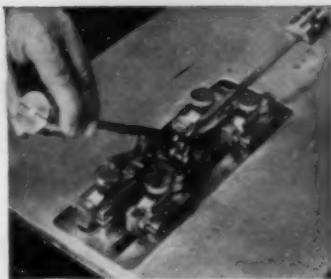
**FLEXLOC®**  
LOCKNUT DIVISION

**sps**

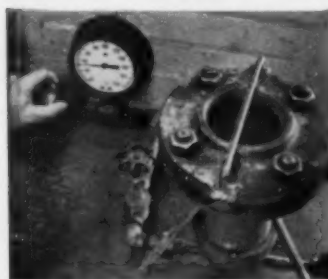
JENKINTOWN PENNSYLVANIA



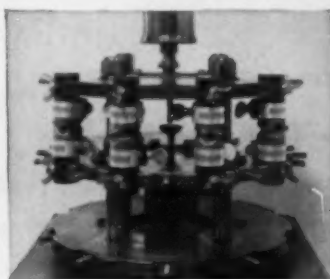
**UNIFORMITY** of weight and thickness of "Fairprene" diaphragm material is assured by beta ray testing. Thickness of the coatings is constantly controlled to meet the most exacting requirements.



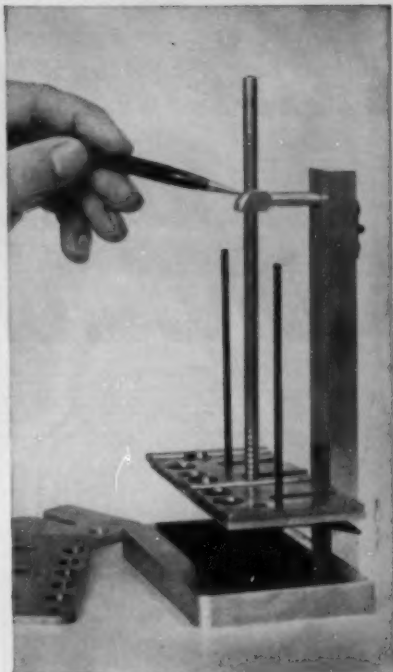
**SCRUB RESISTANCE** of "Fairprene" diaphragm material is demonstrated by scrub test. Coating compound is securely bonded to fabric... is virtually unaffected by constant flexing and friction.



**POROSITY** of diaphragms of "Fairprene" to gases is tested by subjecting diaphragms to high air pressure under water. Absence of air bubbles indicates extreme pressures withstood by "Fairprene" coated fabrics.



**FLEX RESISTANCE** is shown by this flexibility test. Vibrator telescopes years of active service into hours, yet after this rugged treatment "Fairprene" diaphragm material shows no evidence of cracking.



**CONTROLLED SENSITIVITY** is measured by "S-Fold Pliability Test." Immersion in oils and aromatic fuels followed by testing at extremes of temperature demonstrates the control of pliability of diaphragms made with Du Pont "Fairprene."

## For seals, gaskets, diaphragms— Du Pont Fairprene® products pass the test!

Automotive engineers are taking a close look at Du Pont "Fairprene" coated fabrics for use as resilient parts—and with good reason!

Diaphragms, seals and gaskets of "Fairprene" show exceptional resistance to the deteriorating effects of oil products—gasoline, kerosene, oil and grease. They resist abrasion and permanent distortion, remain smooth and flexible. Lightweight "Fairprene" products give years of service despite temperature extremes and have excellent burst and tear strength...

exceptional resistance to loss of coating.

Though "Fairprene" products are now used as seals, gaskets and diaphragms, they can be effectively employed in many other automotive parts.

It will pay you to investigate possible new uses for "Fairprene" coated fabrics in your design. Du Pont engineers will gladly work with you in developing special grades of "Fairprene" to meet your own specifications. For further information, just clip and mail the coupon.

\*"Fairprene" is Du Pont's trade-mark for coated fabrics, sheet stocks and cements.

### DU PONT INDUSTRIAL COATED FABRICS

E. I. du Pont de Nemours & Company (Inc.)  
Fairfield, Conn.



BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

Mail coupon for further information...

E. I. du Pont de Nemours & Co. (Inc.)  
Fabrics Division, A-512, Fairfield, Conn.  
I am interested in "Fairprene" Industrial Products.

( ) Have a representative call.  
( ) Send booklet "Coated Fabrics for Diaphragms."

Name \_\_\_\_\_ Title \_\_\_\_\_  
Firm \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_



# Bendix Products Division

## A good reliable source

FOR AUTOMOTIVE EQUIPMENT

From four wheel brakes to the latest development in power braking, Bendix Products Division has demonstrated its unique ability not only to keep pace but *actually to anticipate* the industry's requirements for the latest and most efficient in automotive components.



TYPICAL EXAMPLES



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## High Spots of This Issue

### ★ Checker Taxi-Passenger Car and Studebaker Trucks

Checker Cab has announced a taxicab which is also readily adaptable for use by private owners. Page 48. Studebaker trucks for 1956 have been restyled and redesigned in many details for wider application. Page 50.

### ★ Specific Power and Torque Higher for 1956

A look at horsepower and torque ratings for 1956 car models emphasizes the new highs and again raises the question of what the future holds. This article analyzes the present situation and gives tabular data on 32 engines. Page 52.

### ★ Automation "Firsts" in Engine Assembly and Testing

Part II, of a three-part series, covers in detail the automation "firsts" employed by Plymouth in engine assembly and inspection. Fully automatic test stands which do not require operator attention are likewise described. Page 54.

### ★ Hudson and Rambler '56 Car Models

Hudson's models for 1956 feature distinctive styling and a new Hornet V-8 engine of 352 cu in. Page 60. The 1956 Rambler offers greater size and an entirely new overhead valve engine rated at 120 hp. Page 61.

### ★ Ford's New Engine and Stamping Facilities

Newest of Ford manufacturing operations in the Cleveland area is Engine Plant No. 2, containing 562,000 sq ft of space. Another new Ford facility is the 1,334,000 sq ft stamping plant, with over 3800 employees. Page 64.

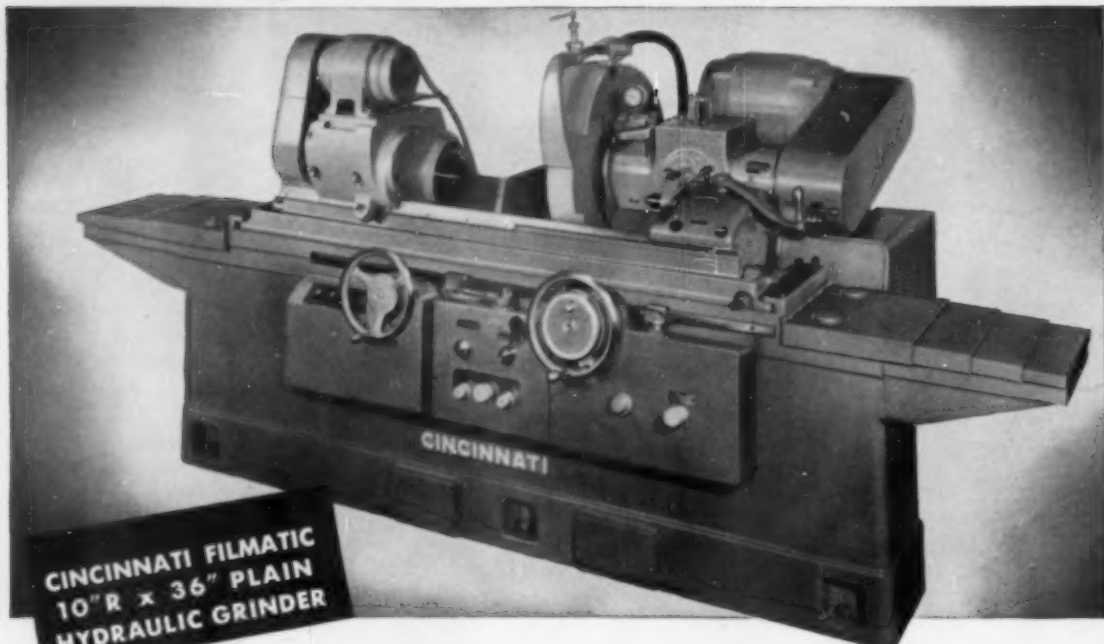
### ★ 47 New Product Items And Other High Spots, Such As:

Modern cars depend on hundreds of springs; industrialization behind the bamboo curtain; aircraft hydraulic meeting; automatic welding of flanges to axle housings; ASBE convention; Rolls-Royce turboprop powers Vickers V-900 plane.

Complete Table of Contents, Page 3  
Automotive and Aviation News, Page 33

AUTOMOTIVE INDUSTRIES COVERS  
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES  
• BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY  
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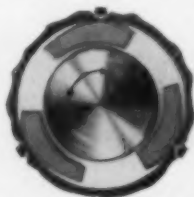
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Cincinnati features that help you attain these highly desirable results are illustrated below. These and many other features, translated into benefits for your shop, are outlined in two attractive catalogs: G-660 for the 6\"/>

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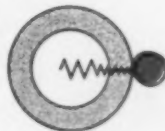
Automatic Wheel Balancing and FILMATIC Grinding Wheel Spindle Bearings are standard equipment. (FILMATIC principle illustrated at the right.) These two cost-reducing features alone are reason enough to choose Cincinnati.



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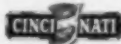


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# News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 113, No. 11

December 1, 1955

## ICC Brake Proposal Requires Specified Failure Safeguards

An ICC proposal for a new motor carrier equipment rule would require truck-trailer combinations under its jurisdiction to have a braking system which will provide, if brakes fail on one axle, that braking on all other axles in the train, except the front or steering axle, will remain operative. This would be accomplished under the system developed by an AMA-TTMA Committee through a series of valves and auxiliary power sources.

The regulation further provides that regular service brakes shall be under the control of the driver at all times by means of regular controls. Should the primary source of braking power or means of applying brakes be lost, an automatic application is mandatory on the towed vehicle and optional on the tractor. In any event, there shall be no automatic application on the front axle of the tractor, in order to prevent loss of steering control.

The auxiliary emergency braking system can be used with the three basic types of brake systems used in combination vehicles—air, vacuum, or electric, and air or vacuum in combination with hydraulic. Compatibility is provided between tractors and trailers using different types of systems.

Effective date of the regulation has been set at Sept. 30, 1956, for new vehicles and March 31, 1957, for all combination vehicles in use at that time. Interested parties have until January 3 of next year to file written statements objecting to, or suggesting changes in, the rule for ICC consideration.

Cost of the changeover to existing equipment is expected to run about \$50 for a single-axle trailer, \$100 for a tandem axle trailer and \$65 for a



## FARM EQUIPMENT RIGOROUSLY TESTED AT FORD

*A farm combine and tractor undergo the tortuous "rumble" course of the new Farm Machinery Evaluation Center recently opened by the Tractor and Implement Div. of Ford Motor Co. Strain-deflecting instruments on the equipment are connected to a mobile Travelab, where test results are recorded. Telephone headsets keep the operators of this research device in constant contact with the tractor driver.*

tandem axle tractor. Cost of installing the system on new equipment by the manufacturer is estimated at between \$50 and \$75 for a tractor and trailer combination with single axles.

## Henry Diaston & Sons, Inc. Is Acquired by H. K. Porter

The business of Henry Diaston & Sons, Inc., has been acquired by H. K. Porter Co., Inc. At the same time, it was disclosed that Porter had also acquired Carlson & Sullivan, Inc., manufacturers of steel rules and measures. The latter will operate as a part of the new Henry Diaston Div. of H. K. Porter Co., Inc.

The main Diaston plant is located on a 65-acre site in Philadelphia. Diaston, which has five wholly-owned subsidiaries, is a manufacturer of saws of all types, files, bar and sheet steel, hand and garden tools, machine knives, steel specialties, and other allied products.

## Kelsey-Hayes To Increase Jet Engine Parts Output

Kelsey-Hayes Wheel Co. is going more heavily into the production of jet engine parts. The company plans to spend about \$250,000 on equipment and retooling to expand operations at its Steel Products Engineering Div., in Springfield, O., a plant it acquired recently.

## Fourth Plant Being Built By Saginaw Steering Gear

Saginaw Steering Gear Div. of General Motors Corp. is planning to construct a new 200,000 sq ft plant near Saginaw, Mich. The multi-million dollar facility will supplement production at three other units located in Saginaw. To be located on a five-acre site, it will employ about 500 persons when completed, and bring total employment of the GM division to approximately 5500.

# News of the AUTOMOTIVE



## AUTOCAR TRUCK AND TRACTOR LINE FOR HEAVY JOBS

Autocar Div. of White Motor Co. has announced a new series of trucks and tractors for extra-heavy hauling jobs. The new All-American line includes both gasoline and Diesel models in either standard or lightweight aluminum and a new series of off-highway trucks. Featuring a wider variety of power transmission and axle options, increased ratings and greater flexibility are also provided on these models.



## AUTOMATIC MOVEMENT OF ROD MAGNETS AT CARBOLOY

Double hopper arrangement pictured is used in Edmore, Mich., plant of Carboloy Dept. of General Electric Co. for initial segregation of tiny rod magnets. Unacceptable rods are dropped in tray, right; those accepted are sidetracked to second hopper which lines up and feeds magnets to machine for outside diameter grinding.

## \$1 Billion Chrysler Expansion Includes First East Coast Unit

The first official report released by Chrysler Corp. on its five-year expansion program, on which it will spend more than \$1 billion, indicates that an East Coast assembly plant will be among the first projects (see *AI* Oct. 1, page 33). The corporation did not give any further details about the plant, but it is highly probable that it will be located in the same general vicinity where both Ford and GM have final assembly plants.

Chrysler has only two assembly plants located outside of Michigan—in Evansville, Ind., and Los Angeles. Present plans call for construction of at least seven regional plants outside of Michigan in expanding market areas.

The \$1 billion allocation will go for land, buildings and equipment, in addition to expanded research on gas turbine engines, electronics, and nuclear and solar energy. Much of the new machinery will be automatic.

The \$1 billion would be in addition to the \$763.5 million which Chrysler already has spent and committed for expansion since World War II. Included in the \$763.5 million is an \$85 million stamping plant.

The corporation has decided to locate the plant on a 200-acre tract in Twinsburg, O., about 12 miles north of Akron. It did not indicate what it would do with the other 500 acres of properties that it acquired for the plant previously.

## Packard Signs New Contract; Union Aims at Studebaker

Studebaker is the only automobile company which has not yet reached an agreement on a new contract with the union. A three-year pact, embodying the GAW principle, was signed by Packard recently.

Covering 9000 workers in the Detroit area, the Packard contract provides wage increases and fringe benefits similar to those granted by the Big Three. The union now is concentrating its efforts on Studebaker, where some local issues have to be worked out with the company.

# AND AVIATION INDUSTRIES

## SAE Releases Test Methods For Motor Vehicle Seat Belts

The Society of Automotive Engineers has released a Recommended Practice that sets up procedures for testing motor vehicle lap belts. A minimum strength of 1500 lb in tension and a loop strength of at least 3000 lb are specified for the seat belt assembly. These values are in agreement with Civil Aeronautics Authority requirements for belts used in civil aircraft.

The new Recommended Practice also covers width, strength, elongation, stiffness, and resistance to mildew and abrasion of the belt webbing.

## Mercury to Expand Area At Its St. Louis Plant

Another sizable expansion is being planned by Mercury Div. of Ford Motor Co., which is on its own this year following divorce from Lincoln. The expansion, scheduled to start at the St. Louis plant, will bring total manufacturing area there to more than one million sq ft, about 25 per cent greater than at present. It is Mercury's second expansion there within a year.

The division started out sales of 1956 models with 36,921 units in October, best such month in history. Sales for the entire 10 months hit 341,618.

## Westinghouse Metals Pilot Unit To Meet Demand for New Alloys

A Metals Pilot Plant designed to bridge the gap between laboratory and commercial production of new alloys and processes, has been opened by Westinghouse Electric Corp. at Blairsville, Pa. The \$6 million facility combines under one roof virtually all types of metal processing equipment.

The 173,000 sq ft plant is designed to process both wrought and cast alloys with equipment flexible enough and large enough to permit actual manufacturing conditions. A large portion of the facility is concerned with processing techniques such as forging, hot and cold rolling, heat treating, shell mold and investment

## CHEVROLET ON TOP AT NINE MONTHS BY 51,244 UNITS

### 1955 New Passenger Car Registrations\*

Arranged by Makes in Descending Order According to the 1955 Nine Months' Totals

MAKE	September 1955	August 1955	September 1954	NINE MONTHS			
				Units		Per Cent of Total	
				1955	1954	1955	1954
Chevrolet	164,760	151,949	106,010	1,226,094	1,033,825	22.32	24.96
Ford	137,080	149,749	107,049	1,106,060	1,033,727	21.38	24.97
Buick	70,630	70,731	41,657	585,090	383,946	10.71	8.91
Plymouth	56,536	57,280	19,136	515,060	380,827	9.43	7.26
Oldsmobile	57,769	55,382	34,130	454,973	367,346	9.32	7.43
Pontiac	48,291	47,216	24,644	407,957	290,449	7.46	6.29
Mercury	33,320	34,681	17,090	281,288	216,238	5.14	5.23
Dodge	24,716	23,726	10,463	217,815	112,582	3.90	2.72
Chrysler	11,967	12,633	8,783	123,313	78,419	2.56	1.62
Cadillac	11,287	12,676	9,227	100,871	82,882	1.99	2.00
De Soto	8,726	8,570	5,100	82,133	57,144	1.66	1.38
Studebaker	7,466	7,319	8,269	76,685	70,617	1.40	1.71
Nash	7,997	9,302	6,783	74,327	64,700	1.36	1.57
Packard	4,067	4,362	3,173	40,060	31,621	.73	.76
Hudson	3,276	4,943	2,565	26,743	26,945	.64	.66
Lincoln	2,462	2,710	3,670	24,064	29,683	.44	.69
Willys	382	415	1,193	5,992	14,329	.10	.36
Kaiser	35	34	714	869	7,144	.02	.17
Misc. Domestic	22	22	373	267	3,677	.01	.07
Foreign	4,119	5,509	2,085	35,745	18,093	.65	.44
Total—All Makes	684,532	656,964	407,844	5,489,129	4,139,272	100.00	100.00

\* Based on data from R. L. Polk & Co.

casting, and powdered metallurgy.

Included in the plant, believed to be the largest pilot plant of its type in the country, are: an 18,000-lb and three smaller forge hammers; a 1000-ton steam-hydraulic forge press; seven forge furnaces; three induction melting furnaces varying in size up

to 5000 lb; a cold hearth furnace; a 1000-hp reversing, hot-rolling mill; a 500-hp reversing, cold-rolling mill; bell type and roller rail box type electric furnaces; a shot pouring facility; shell mold and lost wax investment casting facilities; are furnaces; and other equipment.

## FORD AND CHEVROLET LEAD BUT PERCENTAGE IS DOWN

### 1955 New Truck Registrations\*

Arranged by Makes in Descending Order According to the 1955 Nine Months' Totals

MAKE	September 1955	August 1955	September 1954	NINE MONTHS			
				Units		Per Cent of Total	
				1955	1954	1955	1954
Chevrolet	32,133	31,650	24,495	235,299	223,080	33.30	35.66
Ford	28,443	29,461	21,980	222,672	206,903	31.79	32.80
International	8,251	9,254	6,257	77,992	61,423	11.13	9.77
G. M. C.	6,980	6,920	5,111	60,609	51,293	8.37	8.16
Dodge	5,684	6,080	4,885	60,376	44,931	7.19	7.14
Willys Truck	1,328	1,306	1,017	11,606	8,987	1.76	.92
White	1,489	1,140	879	19,443	8,613	1.49	1.38
Studebaker	634	868	532	9,595	7,600	1.22	1.25
Mask	577	1,061	909	7,761	4,571	1.11	.73
Willys Jeep	831	686	657	7,216	6,002	1.03	.87
Diamond T	330	314	280	2,680	2,011	.46	.32
Divco	301	279	194	2,000	1,774	.36	.26
Reo	344	275	192	2,226	1,734	.32	.28
Kearfoot	183	182	27	607	466	.12	.06
Brookway	80	83	136	776	960	.11	.16
Peterbilt	29	48	8	331	227	.06	.04
F. W. D.	36	23	16	196	304	.03	.05
Federal	3	1	9	31	217	.01	.03
Misc. Domestic	63	73	14	686	491	.10	.08
Foreign	260	229	29	1,419	232	.26	.04
Total—All Makes	89,924	92,979	66,174	706,466	626,680	100.00	100.00

\* Based on data from R. L. Polk & Co.

# News of the AUTOMOTIVE



## ALL-METAL PLANE FOR SHORT-HAUL OPERATIONS

*The Prostrick Twin Pioneer, which recently made its maiden flight, is a versatile and economic plane that is capable of being used either as a small feeder-airliner or as a freighter. Built by Scottish Aviation, Ltd., it is powered by two Alvis Leonides engines and can carry 16 passengers or an equivalent weight in cargo.*

## Wide Distribution Of Stock Is Goal Of Ford Foundation

The Ford Foundation will insist that brokers handling the forthcoming public offering of Ford stock distribute the shares over as wide a base as possible. Demand for the stock, to be offered early next year, apparently will far exceed the initial offering of about seven million shares, and Foundation officials undoubtedly will make some form of stipulation to insure that small buyers may participate.

After the 15-to-1 split of the present non-voting "A" shares, the price of the new voting common stock "A" shares is expected to be in the area of \$60 a share. The offering is expected in late January.

## \$10 Million In U. S. Contracts Is Split Up Among Five Concerns

Contracts totaling more than \$10 million have been awarded to five companies, according to the Commerce Department. Biggest award, valued at \$4.6 million, went to Eaton Mfg. Co., Aircraft Div., Battle Creek, Mich., for manufacture of titanium compressor blades for jet airplane engines. Eaton plans expenditures of some \$8 million for capital equipment and new tools at the Aircraft Div. to handle the order. Another Eaton Battle Creek operation—the Valve Div.—also plans an expansion of its

facilities within the next year or so.

Other contracts include: Thompson Products, Inc., Cleveland, \$1.4 million for installation of facilities at Wright-Patterson Air Force Base in Ohio; Hycon Mfg. Co., Pasadena, Calif., \$1 million for beacons; United Aircraft Corp., Sikorsky Aircraft Div., Bridgeport, Conn., \$1.5 million for production facilities for helicopters; and General Aniline & Film Corp., Ansco Div., Binghamton, N. Y., \$1.8 million for radiographic film.

## New Transmission Plant Being Erected By Ford

The fourth expansion of automatic transmission facilities since 1950 has been started by Ford. A new 1.6 million sq ft plant, first announced last June, will be erected on a 193-acre site in Sharonville, O. When completed, it will employ 4500 persons approximately.

## N. J. Assures GAW Plan After Ohio Rejects It

A ruling by New Jersey's state attorney permitting integration of GAW payments with state unemployment compensation brought virtual assurance that the new jobless pay plans for automobile workers will go into effect next June, as planned. Under contracts with automobile companies,

states where at least two-thirds of a company's employees are located must approve such integration or the GAW plan would be scrapped.

The New Jersey ruling leaves the plan only slim percentage points away from the necessary two-thirds goal, and there are still a number of states which must act on the issue. The union argues that the defeat of the Ohio referendum should not affect the present interpretation of the present law insofar as it applies to Ford and GM agreements.

The union would have to seek a favorable ruling on the payment plan from either the Ohio attorney general or state unemployment commissions. UAW spokesmen, however, have given no indication of how they would force a showdown.

## Chevrolet Notes Popularity Of Two-Tone Cars Gaining

Two-tone color combinations on automobiles continue to increase in popularity. A report from Chevrolet shows that two-thirds of the buyers are requesting dual hues on their cars, compared with 50 per cent last year, and the percentage is even greater on certain models. Nine out of every 10 sports models, for example, featured two-tone schemes of one kind or another.

## Battle Looms In White's Offer To Buy Diamond T

An interesting battle shapes up over White Motor Co.'s offer to buy most of the assets of Diamond T Motor Car Co. for a reported \$8.6 million.

Bohn Aluminum & Brass Co., sole owner of Reo and holder of 12 per cent of the outstanding Diamond T shares, will vigorously oppose the acquisition. Directors of both Diamond T and White have approved an agreement to sell most of Diamond T's assets for approximately \$8.6 million.

The agreement is subject to approval of the Justice Dept. and of Diamond T stockholders who will vote on the proposal Dec. 15. The offer includes cash, receivables, inventories,

# AND AVIATION INDUSTRIES

plant and equipment, patterns, dies, tools, trade marks, and all property except one specified parcel.

S. D. Den Uyl, president of Bohn, said he will oppose the offer, which he states is approximately \$3 million to \$4 million less than stockholder equity as of last July 31. Bohn also is reported to be interested in purchasing Diamond T, which has several assets that could be well integrated with those of Reo.

Diamond T has a tilt-cab design, a Diesel line, a well-established dealer organization, and sheet metal and manufacturing facilities which would be useful to Reo. It also would provide an additional market for Reo engines.

In the event either White or Bohn should acquire Diamond T, there are some interesting ramifications. One involves the pending patent suit brought by White against Diamond T and International Harvester involving the tilt-cab design. Another is the working agreement between Diamond T and International Harvester on cabs, engines, and other components. What would happen in the event of a change of ownership of Diamond T is not clear.

If White is successful in acquiring Diamond T, it reportedly will operate the latter as a division with headquarters in Chicago. Diamond T trucks would be distributed through the present dealer organization.

The acquisition would increase White's total assets to approximately \$115 million. Its line then would include White, Autocar, White Freight-Liner, and Diamond T trucks for good coverage of the market.

## Borg-Warner Sales Top \$400 Million

Borg-Warner Corp. has reported excellent sales and earnings for the first nine months of 1955, particularly in the automotive, household appliance, and home building fields. Sales totaled more than \$405 million, up about \$124 million from the same period last year. Net earnings aggregated \$26 million, against \$14 million last year. Sales and earnings of the new Byron Jackson Div. were not included in the nine-month report.

## TABLOID

Standard Pressed Steel Co. and Cleveland Cap Screw Co. have agreed to combine their plants and other assets. . . . Insuline Corp. of America has become a subsidiary of the Van Norman Co.

Continental Motors Corp. has announced an optional generator to provide lighting or to charge batteries on its industrial aircooled engines.

Mullins Mfg. Corp. and American Radiator & Standard Corp. are said to be discussing a merger.

California Spring Co. opens a new \$1.5 million plant in Los Angeles on Dec. 1 . . . Marion Electrical Instrument Co. has opened a new plant at Manchester, N. H.

Philco Corp. has formed a new Automotive Div. . . . International Business Machines Corp. has formed a new Military Products Div.

Goodrich Tire Co. plans a \$6 million expansion of its Los Angeles facilities. . . . Reynolds Metals Co. has launched a \$11 million expansion program at its Listerhill, Ala., plant.

Standard Oil Co. of New Jersey has announced plans for a record capital outlay of \$1.2 billion during 1956.

Stewart-Warner Corp. and McGraw Electric Co. have halted discussions toward a possible merger of the two companies.

Micromatic Hone Corp. is now offering a new film on stock removal processes, precision and functional surface finishes.

Northrup Aircraft, Inc., Hawthorne, Calif., is expanding its production flight test operations with a new facility at Palmdale, Calif.

Heppenstall Co. has disclosed that it has been negotiating possible purchase of Midvale Co.

Blaw-Knox Co. has acquired ownership of Continental Foundry and Machine Co.

Daimler-Benz has refuted reports that it is producing a gas-turbine-powered automobile.

Temco Aircraft Corp. will manufacture major assemblies for the C-130A Hercules combat transport plane . . . Lockheed Aircraft Corp. has received a \$25 million Air Force order extending production of T-33 jet trainers into 1957.

Commercial Filters Corp. has acquired the filter divisions of Houdaille-Hershey of Indiana, Inc., and Michiana Products Corp.

Kloekner-Humboldt-Deutz A. G. of Cologne, Germany, increased production of its aircooled Diesel engines during the first 10 months of 1955 to 20,000 cylinder units monthly.

Inland Steel Co. has announced a \$260 million expansion for its East Chicago, Ind., basic steel plant.

Allis-Chalmers Mfg. Co. has introduced a new 45 motor grader, powered by a six-cylinder Diesel engine. . . . Kenworth Motor Truck Corp. is now producing a new 802-B earthmover truck-tractor with dump semi-trailer.

# News of the AUTOMOTIVE



## CATERPILLAR SCRAPER IS WIDER AND LONGER

The new Caterpillar DW21 (Series C) tractor with No. 470 scraper features a redesigned Diesel engine rated at 300 bhp at 1800 rpm. The company also introduced another rubber-tired tractor—the DW20 (Series E)—at a recent press demonstration of its extensive line of earth-moving equipment.

## Union Offers Ford Proposal On Stock Plan It Rejected

Opposed to any stock plans for Ford workers during contract negotiations last summer, the UAW-CIO now is welcoming any ideas for such a plan, and has come up with some of its own suggestions. One of them is a chance for hourly workers to purchase the stock at cut rates when

it is placed on the market. Another is a hint to give hourly workers a share or two as a Christmas bonus. In fact, the union has informed Ford that it would be pleased if the company decided to do so.

Salaried Ford personnel will be given a chance to buy Ford stock at

reduced rates when it is available, but hourly workers are not included in such plan at present. The union last summer rejected Ford proposals along this line to hold out for other demands. It seems rather highly unlikely that the company will adopt the union's suggestion for reduced stock to hourly workers at this time. It conceivably could make some sort of provisions at a later date if it so desired.

## New Dodge Police Car Put Into Production

Dodge has put into production its new police car, designated the "Pursuit." The special car differs from the standard production models in that it comes equipped with heavy-duty springs and shock absorbers, special chassis, clutch and seat springs and several other items, such as map lights and variable speed electric wipers.

A 270 cu in. V-8 engine is offered as standard on all police models, while a 315 cu in. V-8, which develops 230 hp with a power package, is optional. The "Pursuit" is available in four models, including a station wagon which can be converted into an ambulance.

## Steering Gear Plant Latest Ford Project

Latest addition to Ford's continuing expansion program is a 1.2 million sq ft steering gear and cold heading plant, to be located in Columbus, O. Representing the 36th new plant to be announced by Ford since 1946, the multi-million dollar unit will employ 3000 persons at an annual payroll of approximately \$15 million.

In addition to production of components and assembly of steering gear units, the new structure will be used for cold forming operations, which will produce about six million small parts daily. Scheduled for completion by mid-1957, the plant will be operated by the Dearborn General Manufacturing Div., which now directs four plants within the Rouge operations and a one million sq ft glass plant being erected in Nashville.

## 1955 RETAIL CAR SALES BY PRICE GROUPS\*

Price Group	Number of Cars							
	September				Nine Months			
	1955		1954		1955		1954	
	Units†	% of Total	Units†	% of Total	Units*	% of Total	Units*	% of Total
Under \$2,000	267,163	56.45	242,493	59.78	3,010,986	55.03	2,499,797	59.70
\$2,001 to \$2,999	207,080	31.97	108,766	26.32	1,719,170	31.40	1,086,982	25.65
\$3,000 to \$3,999	88,536	9.16	46,367	9.96	889,781	16.70	430,115	10.66
Over \$4,000	19,716	2.42	19,864	3.94	182,712	2.79	164,386	3.99
Total	690,314	100.00	408,009	100.00	8,471,325	100.00	4,120,290	100.00

Price Group	Dollar Volume of Sales							
	September				Nine Months			
	1955		1954		1955		1954	
	Dollars	% of Total	Dollars	% of Total	Dollars	% of Total	Dollars	% of Total
Under \$2,000	\$897,433,867	40.38	\$482,863,015	51.41	\$6,716,210,860	47.38	\$4,479,872,886	51.29
\$2,001 to \$2,999	485,463,064	34.35	\$44,826,466	28.36	4,010,563,134	33.30	2,418,747,217	27.71
\$3,000 to \$3,999	198,891,648	11.32	110,114,129	12.04	1,869,357,469	13.57	1,190,003,064	13.73
Over \$4,000	62,692,771	4.42	61,552,545	7.19	618,686,040	9.15	615,506,690	7.27
Total	\$1,412,213,650	100.00	\$907,666,174	100.00	\$12,616,242,213	100.00	\$8,733,930,567	100.00

\* Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.

† New registrations of American made cars only. Does not include imported foreign cars.

# AND AVIATION INDUSTRIES

## Mexico To Hold Exposition For Vehicles in January

The first Mexican International Automobile Exhibition will be held from January 1 to 10 in the Municipal Auditorium at Mexico City.

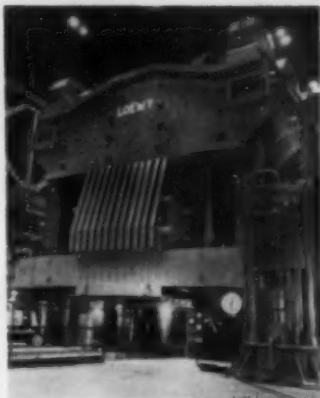
Included in the show will be passenger cars, trucks, buses, motorcycles, marine engines, tires, accessories, and replacement parts.

## ASME Aviation Div. Meeting Studies Heavy Press Program

A comprehensive summary of the Air Force heavy press program from its inception to date was presented at the annual meeting of the ASME Aviation Div. in Chicago on November 14 by various industry and Government authorities. In opening the session, Col. W. J. Adams stressed that the heavy press program had been developed over a period of some 10 years and now involves an investment by the taxpayers amounting to \$1 billion in round figures.

George W. Motherwell, vice-president of Wyman-Gordon Co., stated that the new North Grafton, Mass., facility operated by his company involves an investment of almost \$95 million. Among other pieces of equipment, this plant has a 50,000-ton and a 35,000-ton Loewy press in operation. Alcoa also has a 50,000-ton Loewy unit and a 35,000-ton United press.

Mr. Motherwell, in going on to deal



This closed die forging press of 50,000-ton capacity has been placed on the regular production line at the North Grafton, Mass., plant which Wyman-Gordon Co. operates for the Air Force. Weighing 10,605 tons and standing 10 stories tall, it is suspended in a pit 100 ft deep. Requiring 17 months to assemble, the huge press is turning out components for Lockheed Super Constellations and other aircraft.

with aluminum and magnesium forgings of uncommon size, said that the chief problem appears to be the role of time-temperature-squeeze *versus* impact. Work is being carried on to exploit the closed die technique as much as possible, and techniques are being developed that make possible closer tolerances and less draft to the ultimate goal of no draft. In fact, some parts made recently have critical

areas held to a tolerance of 0.002 in. with no draft, it is reported.

Alexander Zeitlin, vice-president of Birdsboro Steel Foundry & Machine Co., noted the practicability of precision forging to exact blueprint dimensions and tolerances and visualized large and intricate parts which will require little or no machining. In the light of his own experience, Mr. Zeitlin stated that the forging of aluminum parts requires a squeeze on the order of 30,000 psi. He foresees the possibility of building presses of 100,000-ton capacity in a relatively small package—about 100 ft high and 48 ft wide.

## Chrysler Profit Tops \$70 Million In Period

Chrysler Corp. has reported an impressive profit of more than \$70 million for the first nine months of 1955. This figure compares with a \$3.7 million net for the same period last year. Sales soared by 76 per cent to \$2.4 billion.

Although the corporation has not yet reached its goal of 20 per cent of the total industry market (it totaled about 18 per cent at last count), production hit a whopping 1,145,255 units for three quarters, against only 585,783 units in the nine-month period last year. Defense work dropped sharply to \$130 million to represent only five per cent of total sales, against 17 per cent last year.

## PACIFIC AND MOUNTAIN AREAS SHOW GREATEST PERCENTAGE GAINS OVER 1954

### Regional Sales of New Passenger Cars

Zone	Region	September 1955	August 1955	September 1954	Nine Months		Per Cent Change		
					1955	1954	Sept. over August	Sept. over Sept. 1954	Nine Months 1955 over 1954
1	New England	36,791	33,251	24,886	307,132	232,540	+10.82	+49.72	+21.62
2	Middle Atlantic	129,150	123,198	77,333	1,041,074	896,430	- 2.46	+96.36	+29.10
3	South Atlantic	51,133	52,573	49,216	678,160	495,192	- 1.16	+64.64	+36.23
4	East North Central	136,970	169,398	100,367	1,285,132	1,000,774	- 7.34	+96.27	+31.22
5	East South Central	30,680	28,162	21,350	270,067	194,107	-12.76	+43.60	+32.06
6	West North Central	80,907	86,127	38,000	477,060	400,697	+ 4.95	+46.72	+16.46
7	West South Central	66,834	66,729	40,751	582,323	480,288	+15.42	+69.16	+24.90
8	Mountain	22,221	22,697	13,936	175,730	125,602	- 2.95	+89.45	+39.52
9	Pacific	78,983	77,341	40,694	633,731	386,868	+ 2.10	+93.80	+56.86
	Locations Not Determinable					1,762			
Total—United States		654,532	696,964	407,044	5,409,126	4,130,272	- .67	+69.40	+30.13

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt.; Zone 2—N. J., N. Y., Pa.; Zone 3—Del., D. C., Fla., Ga., Md., N. C., S. C., Va., W. Va.; Zone 4—Ill., Ind., Mich., Ohio, Wis.; Zone 5—Ala., Ky., Miss., Tenn.

Zone 6—Iowa, Kan., Minn., Mo., Neb., S. D., S. E. D.; Zone 7—Ark., La., Okla., Tex.; Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.; Zone 9—Cal., Ore., Wash.

# 1948-1955 Sikorsky's 7-year experience with Texaco Regal Oil

**THIS 5,000-ton Bliss press** at Sikorsky Aircraft, Bridgeport, Connecticut, went into service seven years ago with an initial fill of *Texaco Regal Oil R&O* as hydraulic fluid. Some four years later a cooling coil in the hydraulic system broke and the entire charge had to be withdrawn. Engineers found the original *Texaco Regal Oil R&O* still in perfect condition and the system completely free from sludge and rust.

It was, however, decided to use this oil for other purposes in the plant

and to put the press back into operation with a fresh fill of *Texaco Regal Oil R&O*. Recent inspection, after three more years of service, shows the oil still in "like new" condition today—the system perfectly clean.

*Texaco Regal Oils R&O*—a complete line to meet all hydraulic requirements—are turbine-quality oils, refined from choice stocks and fortified with effective inhibitors of rust and oxidation. In fact, tests prove *Texaco Regal Oils R&O* to be *more than ten times as oxidation resistant*

as ordinary turbine-quality oils. Throughout their extra-long service life they provide notable protection against sludge, rust and foam.

Let a Texaco Lubrication Engineer help you increase the performance efficiency of all your hydraulic equipment. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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The Texas Company, 135 East 42nd Street, New York 17, N. Y.



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CUTTING, GRINDING,  
SOLUBLE AND  
HYDRAULIC OILS

TUNE IN: TEXACO STAR THEATER starring JIMMY DURANTE on TV Sat. nights. METROPOLITAN OPERA radio broadcasts Sat. afternoons.

# Men in the News



*Twin Disc Clutch Co. — W. F. Shurtz has been elected vice-president of engineering.*



*Detroit Universal Div., Chrysler Corp. — Arnold W. Hartig and Arthur M. Swigert have been appointed plant manager and works manager, respectively.*



*Continental Aviation & Engineering Corp. — Kenneth C. Smith was named manager of sales and service.*

Detroit Diesel Engine Div., General Motors Corp.—Robert E. Hunter was appointed sales manager.

De Soto Div., Chrysler Corp.—Robert G. Mahler has been named sales promotion manager, and Richard L. Goodwin has been made advertising manager.

Nash Motors of Canada, Ltd.—A. L. Desadeleer has been appointed general plant manager.

Norton Co., Grinding Machine Div.—Howard P. Chace has retired as chief sales engineer, and F. Kenwood Jones succeeds him.

Warner & Swasey Co.—George F. Meyer is now general superintendent.

Pratt & Whitney Co., Inc.—Clifford A. Brooks has been named advertising manager.

Pesco Products Div., Borg-Warner Corp.—Donald R. Spatz is now general sales manager, and H. Charles Yaeger has become manager of manufacturing.

Plymouth Div., Chrysler Corp.—M. L. Dagens has been named director of management development.

Brush Electronics Co. — John H. Harris was named vice-president in charge of planning, and Wallace T. Gray was made general works manager.

Wagner Electric Corp., Electrical Div.—Paul C. Ford has been named chief engineer.



*New Departure Div., General Motors Corp. — Robert H. Wilkie was named manager of the Bristol, Conn., plant.*

*Tung-Sol Electric, Inc. — George M. Keown has been elected vice-president in charge of sales.*



Mack Trucks, Inc.—Lewis E. Minkel was appointed vice-president and sales manager, and Gerald F. Jones was named vice-president and executive administrator.

Fram Corp.—H. G. Kamrath has been promoted to chief engineer in charge of all engineering and research activities.

Mercury Div., Ford Motor Co.—Leon B. Geithman was made assistant to the general manager.

Whitman & Barnes, Inc.—D. T. Meisel is now advertising manager.

Cadillac Motor Car Div., General Motors Corp.—Carl A. Rasmussen is now assistant chief engineer; C. H. Smith, assistant general sales manager, and M. E. Fields, manager of the Detroit Factory Branch.

Clark Equipment Co., Industrial Truck Div.—J. William Kelly has been made sales manager of the Electric Truck Section.

Northrop Aircraft, Inc.—Frank W. McNabb has been chosen chief of quality control, and Don L. Vivrette has been made manager of contract administration.

Dana Corp.—Earl M. Douglas has been named vice-president in charge of technical activities relating to product engineering.

## Necrology

Frederick E. Munschauer, 70, president and general manager of Niagara Machine & Tool Works, died recently, at Buffalo, N. Y.

J. Carl Bode, 53, president of National Carbide Co., died Nov. 11, at Manhasset, N. Y.

Max Schott, 70, a founder, director, and former president of Climax Molybdenum Co., died Nov. 10, at New York, N. Y.

Albert E. Whyman, 53, vice-president in charge of European operations for E. W. Bliss Co., died Nov. 8, in England.

Jack McGrath, 35, well-known Indianapolis Race contender, was killed in an accident Nov. 6, at Phoenix, Ariz.

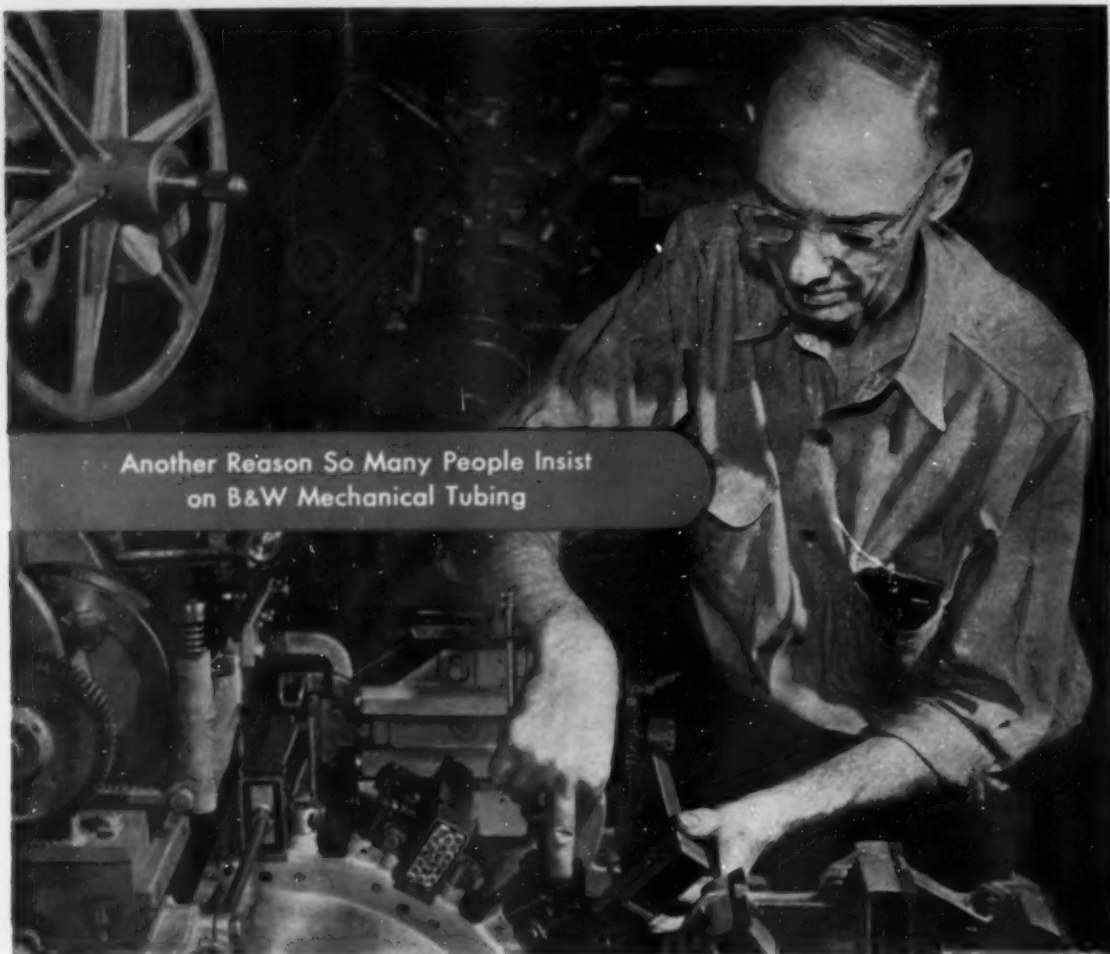
C. S. Holden, 63, vice-president in charge of sales for Motor Wheel Corp., died recently, at Detroit, Mich.

William E. Paris, 61, former vice-president and director of Willys Motors, Inc., died Nov. 1, at Toledo, O.

Edward T. Strong, 78, one-time president and general manager of Buick Div. of General Motors Corp., died Nov. 11, at Flint, Mich.

James E. Straud, 51, assistant sales manager of the western half of the U. S., and Carl F. Diest, 53, Pacific regional sales manager, for Oldsmobile Div. of General Motors Corp., were killed in a plane crash Nov. 1, at Longmont, Colo.

William T. Dunn, 78, pioneer automotive engineer, died Nov. 1, at Cleveland, O.



Another Reason So Many People Insist  
on B&W Mechanical Tubing

## SNUG ARBOR "PUTS THE SQUEEZE" ON CIGARETTES

Smoking pleasure, represented by Viceroy's, Kools and Raleighs, is packaged faster than the eye can follow—7500 packs per machine per hour—at the Brown & Williamson Tobacco Co. plant in Louisville, Kentucky.

Heart of the unique packaging machine is the thin metal cigarette arbor, slightly narrower but longer than a cigarette package, perfectly smooth inside and out; strong enough to maintain its shape in use. Cigarettes, pushed through the arbor into the paper pack, expand slightly to make the tight, crisp package so familiar to smokers. Carbon steel arbors, previously used, required considerable time and labor to prevent rust, corrosion and splitting before and during fabrication.

In 1953, Brown & Williamson called in The Babcock & Wilcox Company whose tubing specialists studied the problems and suggested the use of B&W Croloy 18-8S, Type 304, Stainless Steel Mechanical Tubing, supplied in rectangular shape to Brown & Williamson specifications. Rust, corrosion and splitting during fabrication have been eliminated with estimated savings of 15 per cent.

You can "put the squeeze" on your operating time and costs by starting with the *right* B&W Mechanical Tubing—carbon, alloy or stainless—for your requirements. Mr. Tubes, your link to B&W, is ready, willing and able to give you the benefit of his long experience. Or write for Bulletin TB-361. AI.



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TUBULAR PRODUCTS DIVISION

General Offices: Scranton, Pa., Pennsylvania

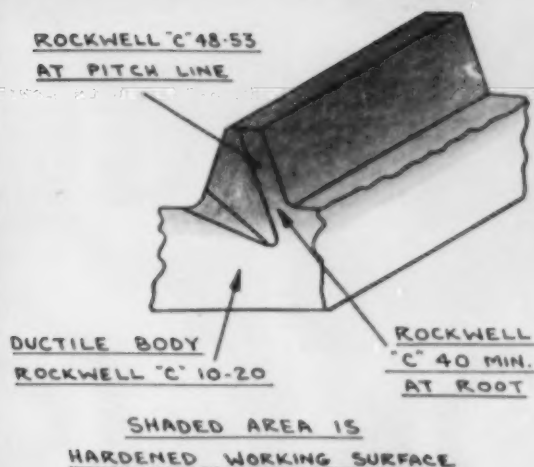
Plants and Products

Scranton, Pa.—Seamless Tubing, Welded Stainless Steel Tubing  
Allentown, Ohio—Welded Carbon Steel Tubing  
Milwaukee, Wis.—Seamless Tubing, Welded Stainless  
Steel Tubing, Seamless Welding Fittings

TA-5043M



**THIN!**  
**TOUGH!**  
...and  
"tender-hearted"



**T**HE MANUFACTURE of flywheel ring gears poses special problems. Sectional thickness is usually less than three-quarters of an inch. To withstand the impact force of the starter pinion, the gear teeth must be hard. But the gear body itself should be unhardened so that it will conform tightly to the flywheel, and "give" under the stress that might snap a brittle gear.

Note how DOUBLE DIAMONDS are made to be thin, tough, "tender-hearted." The above photo of a gear twisted into a pretzel shape graphically demonstrates ductility. The sketch at right shows three important

areas: the wide and deep hardness pattern, the generous area of transition, and the ductile body. These extremes are achieved in DOUBLE DIAMOND Flywheel Ring Gears by controlled selective heat treatment—all essential to flywheel ring gears that provide the best possible performance.

Our Engineering Department will be glad to make constructive suggestions on the design of flywheel ring gears, or on the many other types in which we specialize. Write, phone or wire—depending on the urgency of your need.



FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS  
GEAR-MAKERS TO LEADING MANUFACTURERS

# Automotive Gear Works, inc.

ESTABLISHED IN 1914

RICHMOND, INDIANA

## ACME MODEL XN

*produces 2,400 completed forgings per hour!*

A standard 3" ACME XN forging machine is producing, in multiple operations, a completed forging with every stroke of the machine in the plant of a large automotive manufacturer. Continuous operation with an automatic feeding device makes this amazing production possible.

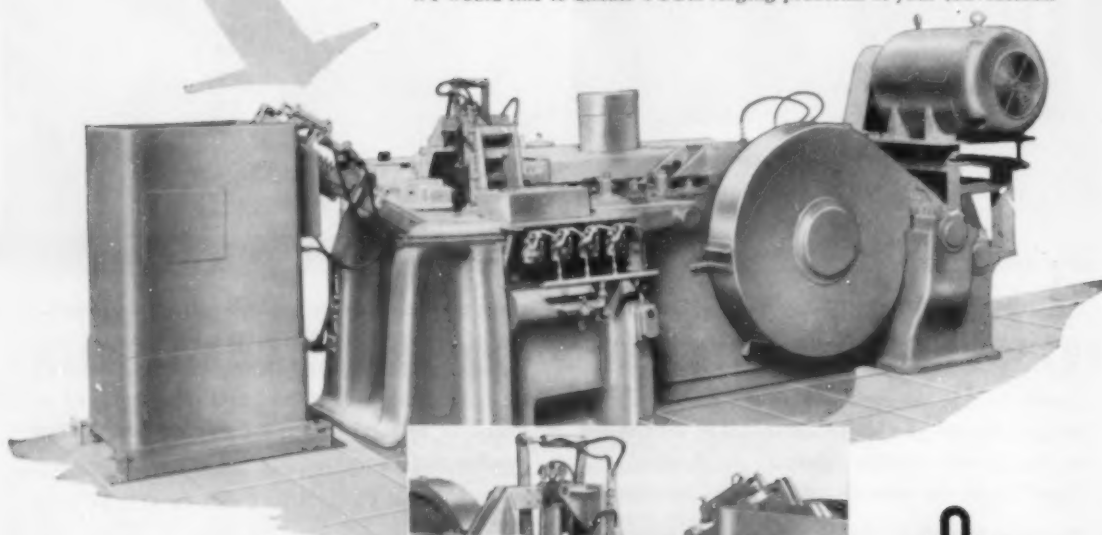
### PHENOMINAL SAVINGS

The increase in output through continuous operation of this ACME XN forging machine results in savings which are not only impressive but approach the incredible. The ACME XN with automatic feed is adaptable to either single or multiple operation forging.

Every job, of necessity, calls for special design in the feed mechanism depending upon the shape, size and weight of the material involved.

ACME XN forging machines are made in capacities from 1" to 5".

We would like to discuss YOUR forging problems at your convenience.



*Seventy-five Years  
of Continuous Forging  
Development*



## THE HILL ACME COMPANY

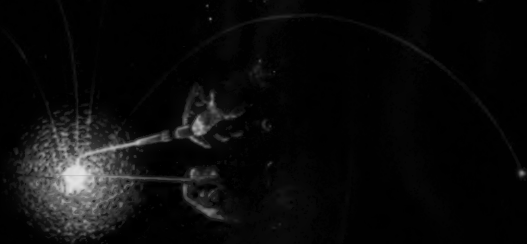
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**4130 steel is your best bet for light sections**



**4100 steels are your best bet**

Chromium Molybdenum Steel like AISI SAE 4130 is the answer for parts requiring high strength and toughness in light sections. For aircraft parts, heat-treated compressed gas cylinders and other thin sections, the move is to plentiful Moly. For information, write Climax Molybdenum Company, 500 Fifth Avenue, New York 36, N. Y.



**CLIMAX MOLYBDENUM**



# ET!



Only Quiet One-Shot "Magnamatic" has Torque Control **PLUS** all these advantages:

- Doesn't require frequent readjustment to hold torque value
- Completely disengages the instant the fastener is run to desired tightness.
- Eliminates stripped threads, sheared fasteners, surface damages.

## "Magnamatic" controlled-torque screwdriver at work!

CP One-Shot "Magnamatic" is the quietest screwdriver-nutrunner ever developed! Clutch buzz and ratcheting have been eliminated and exhaust noise is effectively muffled by a new principle of baffling.

Quiet One-Shot "Magnamatic" is an air-driven screwdriver-nutrunner that can be set to run nuts and screws to specified torque. Here's how: The Alnico magnetic One-Shot clutch, adjustable to specified torque, disengages completely the instant the fastener is driven to desired tightness. Maintains the selected torque setting indefinitely—prolongs clutch jaw life. Inexperienced operators don't burr screw heads, strip threads, shear fasteners, or damage work. Screw bits last longer.

### CAPACITIES:

#4 screws to 3/8" bolts.  
Reversible and non-reversible types.



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Rock Drills • Hydraulic Tools • Vacuum Pumps • Aviation Accessories

AUTOMOTIVE INDUSTRIES, December 1, 1955

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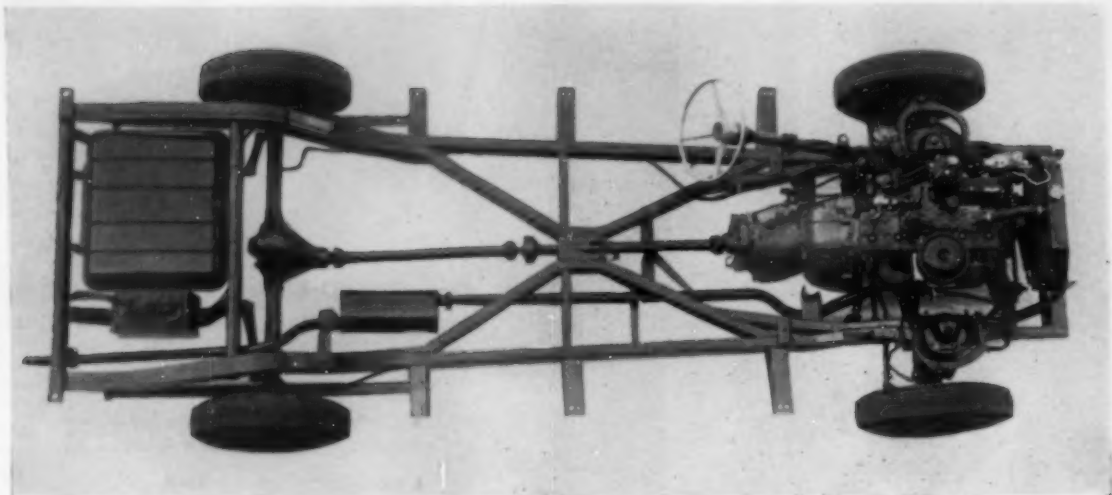
Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

# CHECKER ANNOUNCES

## *Taxi-Passenger Car Models*



*The chassis is simple and rugged*

**B**ACKED by an outlay of almost \$5-million for new assembly lines, conveyors, a battery of new Clearing presses, Westinghouse welders, dies, and fixtures, etc., the Checker Cab Corp., Kalamazoo, Mich., has introduced a newly designed taxicab model for sale to its own operating divisions as well as to independent operators. See AI Nov. 15, page 40. It also represents a major switch in merchandising since the cab is readily convertible to a passenger car for use by private owners as well as fleet operators. For this purpose the public will be provided with a rugged vehicle said to be capable of operating over great mileages without requiring much maintenance and providing exceptional operating economy where high performance is not expected.

The new taxicab will be available in two models—the A-8 Standard with conventional equipment; the A-8 Div-Er-Matic Special, fully equipped with such extras as a fully automatic transmission, Bendix linkage type power steering, and power brakes. The Standard model will be priced at \$1808; the Special at \$2206. It should be noted that these prices do not include tax or delivery and do not include the cost of tire equipment since

taxicab operators generally get tires on a rental basis.

Although the price on the Special as a passenger car has not been established, it is expected to be only a little higher than the \$2206 figure. When specified as a passenger car, the vehicle can be trimmed in a choice of textiles, and is available with an engine power package to increase output to 113 hp.

As illustrated, the new Checker cab has been styled along conventional lines and with the minimum of ornamentation. It is mounted on a rugged chassis frame with wheelbase of 120 in., overall length of 200 in., and has a turning radius of only 37 ft. Being designed specifically for taxicab operations, the vehicle is equipped with the same Continental engine used heretofore, fitted with a special camshaft to provide maximum torque with a relatively flat torque curve extending over the range of 1000 to 1600 rpm. The whole setup is designed for maximum fuel economy—since fuel is the primary item of cost—at the expense of performance and starting acceleration. Nevertheless, the vehicle is capable of attaining around 75 mph on the open highway.

For passenger car use the engine will be fitted with



	Standard L-head	Special L-head
Type .....	8	8
No. Cylinders .....	3 $\frac{1}{16}$	3 $\frac{1}{16}$
Bore (in.) .....	4 $\frac{3}{16}$	4 $\frac{3}{16}$
Stroke (in.) .....	226	226
Displacement (cu in.) .....	6.7 to 1	6.7 to 1
Compression Ratio .....	90 @ 3000 rpm	113 @ 3000 rpm (with power pack)
Bhp (max) .....	180 @ 1000-1600 rpm	180 @ 1000-1600 rpm
Torque (lb ft) .....		

a special camshaft and dual downdraft carburetor. The standard taxicab engine also is available with a special head for compression ratio of only 5.43 to 1 when desired for low speed, low grade fuel operations.

The new chassis features a return to independent front suspension, using coil springs with central mounting of Gabriel direct acting shock absorbers, the suspension utilizing the latest type Thompson Products ball joint mechanism.

Ross cam-and-lever type steering gear with 19 to 1 ratio is standard; the Bendix linkage type power steering mechanism being available at the buyer's option.

A Spicer semi-floating, hypoid gear rear axle is standard, used in conjunction with a Spicer propeller shaft with center support ball bearing mounted in rubber at the frame X-member.

Service brakes are Wagner hydraulic on all four wheels. They are of self-centering, adjustable type.

Auto-Lite electrical equipment is standard, including a 45-amp capacity generator. A 50-amp generator is available as optional equipment.

The standard chassis includes a 10-in. single plate

Borg & Beck clutch and three-speed Warner Gear transmission of heavy duty taxicab type.

On the Special version, the company supplies a Detroit Gear Div. automatic transmission which is similar to the drive supplied for Studebaker cars. The company claims that in taxicab operations this automatic drive shows slightly higher fuel economy than does the manual shift transmission setup. This is accounted for by the fact that with the automatic transmission the driver no longer can operate the vehicle in second gear as he does customarily with manual shift in heavy traffic.

Power brakes for this model are of Bendix Hydrovac type. The Special also includes a four-way electrically-operated seat adjusting mechanism as well as a ventilating type rear window controlled electrically from the driver's position.

Since simplicity for maintenance is paramount, the entire design aims at ready accessibility. All four fenders may be readily removed in a matter of minutes. The front grille, of two-piece sheet metal construction, can be removed for repair. The hood, too, can be readily detached by removing four bolts.

# Studebaker Brings Out

## STUDEBAKER TRANSTAR TRUCKS

Model	Nominal Rating (Tons)	Wheelbase (Inches)	Gross Vehicle Weight (Lb)	Engine Size (Cu In.)	Type	Horsepower
2E5.....	½	112, 122	4,800	185.6	6-cylinder In-line	92
2E7.....	½	112, 122	5,000	224.3	V-8	140
				224.3	V-8	160
2E12.....	¾	122	7,000	224.3	V-8	140
				224.3	V-8	160
2E13.....	1	131	7,600 (single rear tires) 9,600 (dual rear tires)	259.2	V-8	156
2E28.....	1½	131, 155	14,000	259.2	V-8	156
2E38.....	2	131, 155, 171	16,000	259.2	V-8	156
				259.2	V-8	175

**E**NGINEERING changes in the 1956 line of Studebaker trucks include the electric shift with two-speed rear axle, increases up to 700 lb in gross vehicle weight on pickup models, new 12-volt electrical system, new wide tread rear axle, larger capacity brakes and springs, and two-stage springs as standard equipment.

In styling, Studebaker trucks have taken on new front end appearance with a higher, wider, more massive hood incorporating a functional cooling vent. The redesigned grille includes new combination parking and directional signal lamps.

The new Transtar line ranges from ½-ton pickup models to two-ton heavier duty trucks. In the light duty line, wheelbases of 112, 122 and 131 in. will be available with gross vehicle weight ranging from 4800 lb in the ½-ton model to 9600 lb in the one-ton model. Four engines will be offered—92 hp-185.6-cu in. in-line economy engine, and 140 hp or 160 hp-224.3-cu in. and 156 hp-259.2 cu in. V-8 engines. Pickup bodies will be 6½ to 9 ft in length, stake and platform types 8 and 9 ft.

The heavier duty line, with a range of gross vehicle weight from 14,000 to 16,000 lb will include 131-in., 155-in. and 171-in. wheelbases. Both the 1½ and two-ton models will use the 259.6-cu in. 156 hp engine, and for the two-ton only, a more powerful 175-hp version will be available.

Models include chassis-cab and factory installed 9-ft through 14-ft stake and platform bodies.

Larger payload capacity has been achieved in the light duty models by gross vehicle weight increases of as much as 700 lb. In addition, light duty pickup models have been redesigned to give 51½ in. wide clear-floor space. In making this design change, a new wider tread rear axle has been adopted which allows elimination of the wheel housings and provides greater stability. The new wider pickup bodies, plus new longer bodies, result in a payload volume capacity increase of as much as 20 per cent.

Oil bath air cleaners will be standard for the first time on all models. A new 12-volt electrical system will also be standard through the line. The ignition key starter will replace clutch pedal starters on all Transtar trucks.

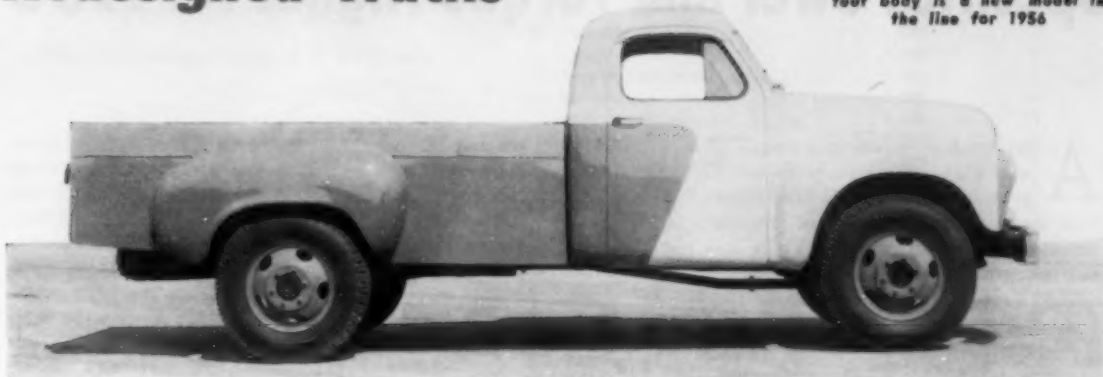
Two-stage rear springs will become standard equipment in the light duty line to handle anticipated heavier loads without reducing the easy riding characteristics of these models. The larger 259.2-cu in. 156-hp V-8 Power-Star engine, previously used only in heavier models, will be introduced as the standard power plant for the division's one-ton models.

The 224.3-cubic inch V-8 Route-Star, with a bore of 3-9/16 and a stroke of 2-13/16, will be the power plant for some ½-ton models and all ¾-ton units. Compression ratio is 7.5-1 and torque is 202 lb ft at 2800 rpm.

Standard in the light duty ½-ton and ¾-ton models is the three-speed synchromesh transmission with an optional fourth speed overdrive available. The new

# Redesigned Trucks

This one-ton truck with a also-foot body is a new model in the line for 1956



automatic transmission being introduced for Studebaker passenger cars will be optional with the 224.3-cu in. engine.

The one-ton model has a four-speed spur gear and an optional four-speed synchromesh transmission. In the heavier duty models the four-speed synchromesh, which has been optional for the 1½-ton units, becomes standard equipment and a five-speed direct drive transmission is optional.

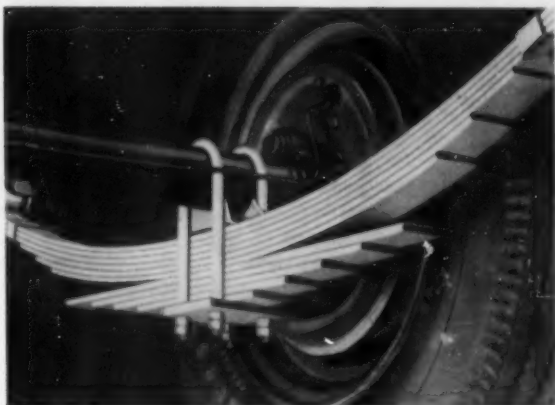
For the first time, on two-ton models, an electric shift with a two-speed dual purpose axle will be offered. With the optional five-speed direct drive transmission, this will give a choice of 10 speeds forward and two in reverse.

The 1½-ton models will have increased rear spring capacity through use of an auxiliary spring as standard equipment.

Advances on the two-ton model include a 38 per cent increase in rear spring combined capacity to 6600 lb, and brake boosters as standard equipment.

A choice of a standard and deluxe three-man cab will be offered for the first time.

Safety features include instrument panel crash pads, optional seat belts, oversize full-width rear window, and non-glare instrument panels.



Two-stage springs become standard equipment on all light-duty Studebaker trucks



New half-ton pickup model of 5000 lb GVW with 122-in. wheelbase

# Specific Power and Torque Higher for 1956

**A**DVERTISED horsepower and torque ratings have hit new highs this year, with the Packard Caribbean at 310 hp and Cadillac Eldorado at 305 hp. This answers the question asked frequently last year—"How high are they going?" There still remains the question—how high can they go, considering the ratings now on the record?

We remind our readers once again that in 1950 only Cadillac and Packard Custom models had ratings of 160 hp; while the Buick Roadmaster and Lincoln

boasted 152 hp. This year with the widespread availability of the so-called "power packs"—which include four-barrel carburetors—Chevrolet and Plymouth offer 205 and 200 hp respectively, while the standard Ford Thunderbird engine is rated at 202 hp. Just by comparison with 1955 ratings, the power-packed Big Three models exceed the ratings of all but the high priced cars featured last year. For a quick comparison refer to Table 1, page 48, AI, February 1, 1955.

The number of V-8 engines, together with various

## COMPARATIVE DATA . . . 1956 OHV V-8 PASSENGER CAR ENGINES

	BHP (max)	Displace- ment (cu in.)	Ratio Bhp/cu in.	Torque (lb ft)	Com- pression Ratio	Bore/Stroke Ratio	Ratio Torque/cu in.
1. Cadillac Eldorado . . . . .	305	365	0.836	400	9.75	1.10	1.096
2. Packard Caribbean . . . . .	310	374	0.829	405	10	1.18	1.083
3. Buick Series 80, 60, 70 . . . .	255	322	0.792	341	9.5	1.25	1.059
4. Chrysler New Yorker . . . . .	280	354	0.791	380	9	1.08	1.073
5. Imperial . . . . .	280	354	0.791	380	9	1.08	1.073
6. Golden Hawk . . . . .	275	352	0.781	380	9.5	1.14	1.080
7. Cadillac . . . . .	285	365	0.781	400	9.75	1.10	1.096
8. Packard . . . . .	290	374	0.775	405	10	1.18	1.083
9. Lincoln . . . . .	285	368	0.774	401	9	1.09	1.090
10. Chevrolet * . . . .	205	265	0.774	268	9.25	1.25	1.011
11. De Soto Fireflite . . . . .	255	330.4	0.772	350	8.5	0.97	1.059
12. Chrysler Windsor* . . . . .	250	331	0.755	340	8.5	1.05	1.027
13. Olds 98 and Super 88 . . . .	240	324	0.741	350	9.25	1.13	1.080
14. Dodge Super Red Ram* . . . .	230	315	0.730	316	8	0.95	1.003
15. Studebaker President . . . . .	210	289	0.727	292	7.8	0.98	1.010
16. Plymouth* . . . . .	200	277	0.722	272	8	1.19	0.962
17. Mercury . . . . .	225	312	0.721	324	9	1.10	1.038
18. Thunderbird . . . . .	225	312	0.721	324	9	1.10	1.038
19. Pontiac* . . . . .	227	317	0.716	312	8.9	1.21	0.984
20. Studebaker Commander* . . . .	185	259	0.714	260	7.8	1.10	1.004
21. Olds 88 . . . . .	230	324	0.710	340	9.25	1.13	1.049
22. Dodge Red Ram . . . . .	189	270	0.700	266	8	1.11	0.965
23. De Soto Fire dome . . . . .	230	330.4	0.696	305	8.5	0.97	0.923
24. Ford Thunderbird . . . . .	202	292	0.692	289	8.4	1.14	0.990
25. Buick Series 40 . . . . .	220	322	0.683	319	8.9	1.25	0.991
26. Clipper . . . . .	240	352	0.682	350	9.5	1.14	0.994
27. Chrysler Windsor . . . . .	225	331	0.680	310	8.5	1.05	0.937
28. Plymouth Belvedere . . . . .	187	277	0.675	265	8	1.19	0.957
29. Ford . . . . .	176	272	0.647	264	8.4	1.09	0.971
30. Pontiac . . . . .	202	317	0.637	294	8.9	1.21	0.927
31. Hudson Hornet . . . . .	220	352	0.625	320	9.55	1.14	0.909
32. Nash Ambassador . . . . .	220	352	0.625	320	9.55	1.14	0.909

\* Power package—4 bbl. carburetor.

## COMPARATIVE RATINGS

### TORQUE/CU IN.

#### 1956 Passenger Car V-8 Engines

options, has grown so large that the current study not only is restricted to V-8's but we have elected to list only the highest advertised options for each engine. Consequently, the tabulation lists the ratings only for power-pack options where these are available. Even so, the tabulation covers 32 engines.

Perhaps the most important news is that all passenger car engines, including the sixes which are offered as usual, have adopted the 12-volt electrical system. Consequently, this year for the first time marks the complete passing of 6-volt system, with 12 volts standard for the industry. This must be good news indeed for producers of electrical equipment who will now enjoy the benefits of volume production.

High torque ratings are emphasized even more this year. It has become recognized that high performance, particularly with respect to acceleration and passing ability, is more a function of high torque at low speed than top horsepower ratings at top speeds emphasized heretofore. In fact, a number of manufacturers found it desirable to increase engine displacement — either by increasing the bore or increasing both bore and stroke — to effect better torque ratings this year.

In cases where the stroke was increased, the bore/stroke ratio was reduced a few percentage points below unity. This contrasts with last year's tabulation in which all V-8 engines were considerably over square.

Top rating of bhp/cu in. this year goes to the Eldorado engine with a ratio of 0.835, while the Packard Caribbean ranks second with a ratio of 0.828. Some impression of the gain in bhp/cu in. ratings this year may be visualized from the fact that the lowest rating last year was 0.571, whereas the lowest rating for '56 is 0.625.

Similarly, torque/cu in. has reached a higher plateau this year. Last year the top rating was 1.042, lowest rating 0.842. By contrast, the top rating for '56 is 1.09, lowest rating 0.909.

Compression ratio has been stepped up sharply this year. Top rating goes to Packard with a ratio of 10 to 1, Cadillac being a close second with a ratio of 9.75 to 1. Statistically, the lowest compression ratio is 8 to 1. Although Studebaker engines alone have a ratio of 7.8 to 1 they offer an option of 8.3 to 1.

The general level of bore/stroke ratio remains about the same, although the tabulation shows four basic engines with ratio less than unity. Top ratio remains

	Torque/cu in.	Ranking Bhp/cu in.
1. Cadillac Eldorado	1.096	1
2. Cadillac	1.096	7
3. Lincoln	1.090	9
4. Packard Caribbean	1.083	2
5. Packard	1.083	8
6. Olds 98 and Super 88	1.080	13
7. Golden Hawk	1.080	6
8. Chrysler New Yorker	1.073	4
9. Imperial	1.073	5
10. Buick Series 50, 60, 70	1.059	13
11. De Soto Fireflite	1.059	11
12. Olds 88	1.049	21
13. Mercury	1.038	17
14. Thunderbird	1.038	18
15. Chrysler Windsor*	1.027	12
16. Chevrolet*	1.011	10
17. Studebaker President	1.010	15
18. Studebaker Commander*	1.004	20
19. Dodge Super Red Ram*	1.003	14
20. Clipper	0.994	26
21. Buick Series 40	0.991	25
22. Ford Thunderbird	0.990	24
23. Dodge Red Ram	0.985	22
24. Pontiac*	0.984	19
25. Plymouth*	0.982	16
26. Ford	0.971	29
27. Plymouth Belvedere	0.957	28
28. Chrysler Windsor	0.937	27
29. Pontiac	0.927	30
30. De Soto Firedome	0.923	23
31. Hudson Hornet	0.909	31
32. Nash Ambassador	0.909	32

\* Power Package — 4 bbl. carburetor.

the same as last year at 1.25 to 1 for Buick and Chevrolet, but marks the addition of the Buick 40 engine in this top rating. Another gain is found in the case of Pontiac where the bore/stroke ratio has been increased from 1.15 to 1, to 1.21 to 1.

Table 1 is given in comprehensive form, following the pattern established last year. And again we have introduced Table II ranking engines in descending order of values for torque/cu in.

Generally speaking, engine designers have employed their skills in boosting horsepower ratings without increasing the size of the power package materially, except in the few instances where engine displacement was increased primarily to gain torque ability. Engine output has been increased in various ways: by boosting compression ratio; by further streamlining of combustion chambers; by further improving breathing; by the introduction of four-barrel carburetors and twin exhaust systems; and by other means. Breathing, in particular, has been improved by increasing valve lift, by increasing valve diameters, by opening up intake and exhaust port diameters, and by

(Turn to page 114, please)

# Automatic Engine Assembly and Testing Are Automation "Firsts" at Plymouth Plant

**A**LTHOUGH automatic assembly machines for small components have been in use for some time, specialized transfer equipment for larger assemblies such as the cylinder head and final engine assembly are claimed as "firsts" for the Plymouth V-8 engine plant (see AI, September 15, 1955). The engine assembly line runs some 565 ft in length, while the two cylinder head sub-assembly lines are each 120 ft long.

Automatic engine assembly is handled on a Cross Transfermatic pallet type machine which is quite similar to the familiar Cross transfer machines for metal cutting. The transfer conveyor is arranged for a predetermined cycle of intermittent movement, providing a dwell at all stations where the engine and pallet assembly enters a station for tightening specific fastenings automatically. As seen in the sampling of illustrations all fastenings are tightened automatically, reducing the operators' functions to the installation of component parts.

The assembly line is composed of three major sections with 47 stations for the first section, 44 stations for the second section, and 49 stations for the third section. Thus the line extends over a total of 140 stations.

Among the interesting features of the line is the procedure for the assembly of rod and piston assemblies. These are installed two at a time at four stations, the groups of fastenings being made up in the same order. One of the large stations is the 16-spindle cluster for tightening all but two oil pan fastenings simultaneously. Perhaps the largest one is the V-type arrangement of nut runners for tightening 10 cylinder head bolts on each side.

The Cross assembly machines have a unique design feature common to most of the equipment installed in this plant, namely, a system of standard-

ized machine mounting bases, making it feasible to interchange units of the same type. This is done to permit replacement of stations without shutting down the operation while repairs are being made. Moreover, it will be possible to replace sections with new ones in the event of a change in sequence or procedure, by using the same mounting. In the case of the assembly machines, mounting pads of standardized design are found along the sides of the base of the machine to facilitate the shifting of assembly stations along the line, as well as the introduction of any number of additional units as required.

All this spells uncommon flexibility and adaptability to change for any reason, including changes in product design. Up to now some of the exceedingly complex and expensive transfer machines have been considered to be relatively inflexible. Plymouth has found a way to provide unusual flexibility and freedom from restriction of product design or improvement in manufacturing techniques.

There are 25 overhead conveyors in the monorail system with a total length of 17,000 ft; of this 10,290 ft feed the main assembly line. An interesting innovation is the elimination of the usual storage bins along an assembly line for small parts and fastenings required at the various stations. Instead of this, Plymouth has developed a system of special plastic trays for transporting small parts along the assembly line. Each tray is color coded to make it easy for the workers to identify the parts they need, and carries all necessary parts needed in the assembly of one engine.

The plastic trays have the various parts deposited in them by a group of special assembly hopper fed machines for parts that can be hopper fed and those that cannot be hopper fed are deposited into the tray by operators.

In the previous article on this

## PART II

of a Three Part Article

*Illustrated*

• PLYMOUTH •

## CYLINDER HEAD LINES

By

Joseph Geschelin



*This is an overhead shot of the cylinder head lines installed by W. F. & John Barnes. To the right in the foreground is one of the Cross Toolmeters provided by Plymouth for all transfer machines, regardless of make. In the background on the catwalk is the impressive installation of W. F. & John Barnes Detecto panels for trouble shooting on the electric circuits of the entire installation in this department.*

plant (see AI, November 15) we touched on the production of crankshafts and pistons, among other things. Here we shall cover some highlights of the cylinder head and cylinder block lines.

Cylinder head machining requires four similar lines, each 420 ft in length. As mentioned in the previous article, these lines were made the responsibility of W. F. & John Barnes as the prime contractor. First operation is performed in an enormous horizontal Cincinnati broaching machine of familiar type. As usual it has three stages of operation—broaching of exhaust manifold faces and locating spots, turnover at the central station, broaching the block joint face and intake manifold face.

All other machining operations are performed in a group of four W. F. & John Barnes transfer machines. The first of these is a 26-station, 27-head transfer machine for the following operations: mill rocker arm brackets; mill transfer bosses; drill oil and water holes; drill cap screw holes; ream dowel holes; spot face screw holes; rough exhaust throats; drill exhaust valve guides; hollow mill exhaust valve spring seats; and blow out and probe drilled holes.

Next is a 19-station, 14-head transfer machine that does the following operations: drill, chamfer, and ream spark plug holes; drill, chamfer, ream core hole; drill and countersink intake manifold cap screw holes; drill push rod holes. Blow out and probe cap screw holes.

The third W. F. & John Barnes transfer machine has 25 stations and 16 heads, handles the following sequence of operations: rough intake throats; drill in-

take valve guides; hollow mill spring seats; tap all tapped holes; drill and gun bore rocker shaft holes.

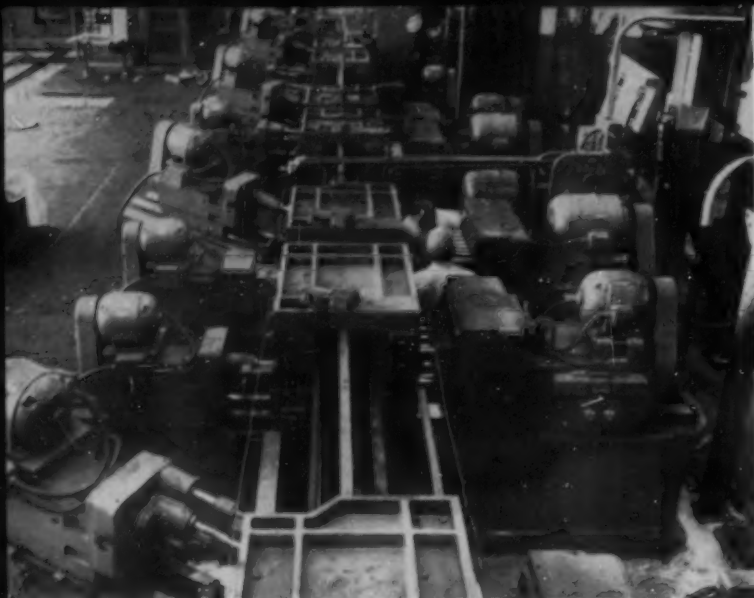
The fourth unit has 18 stations and seven heads for semi-finish and finish of valve seats; and finish gun bore of valve guides.

Cylinder block production requires two lines, each 1380 ft in length. Prime contractors on these lines were Greenlee and Ex-Cell-O. The first operation is performed in one of the largest of the Cincinnati horizontal surface broaching machines made to date—12 ft high, 19 ft wide, 59 ft long—with mechanical drive. It finishes the top, left bank, right bank, locating pads, and panrail. As blocks come out of the first broach, they enter a somewhat smaller Cincinnati broaching machine. Here the block is turned 90 deg to present the ends for broaching. This is done in two steps—the rear end is broached first, then the block is turned 180 deg in a central fixture to present the front end.

A long sequence of operations then takes place in a succession of five Greenlee transfer machines. These machines and their functions are summarized below.

First stage: 27-station, 14-head Greenlee — drill locating holes, bore main bearing line, rough-bore cylinder bores.

Second stage: 40-station, 14-head Greenlee—machine



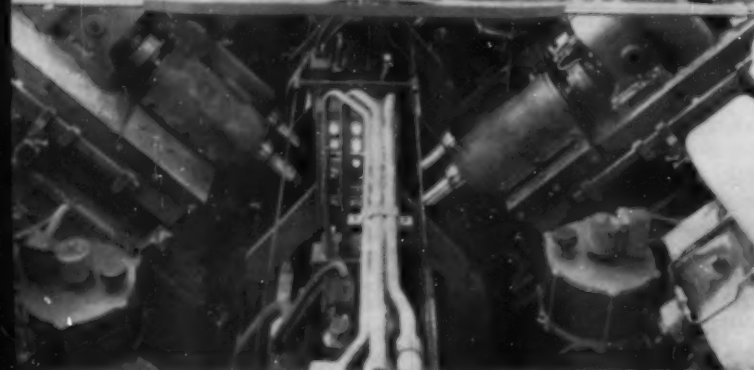
◀ Portion of one of the five enormous transfer machines installed on the cylinder block line by Greenlee. It will be noted that most of the heads on these lines are installed horizontally.

▶ Perspective view of Barnesdrill installation of cylinder honing machines on the cylinder block line. The complex control board for each group is at the right, at the operator's station



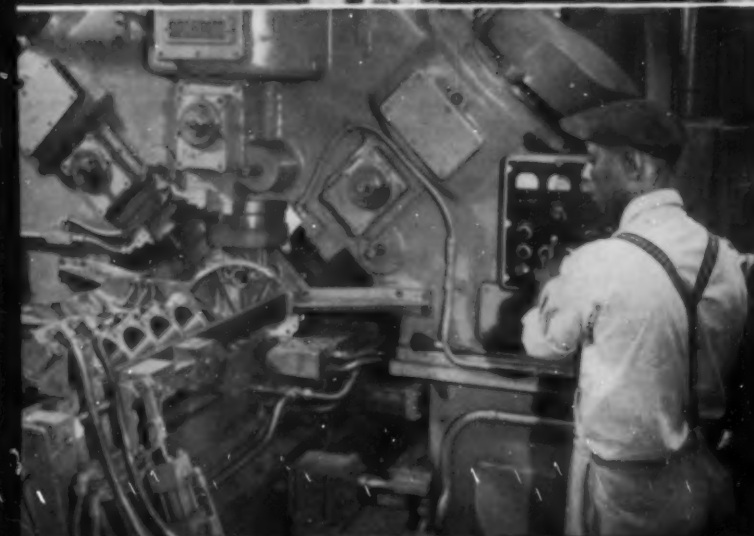
◀ View taken overhead to show one of the Ex-Cell-O precision boring transfer machines for boring cylinder barrels. A 16-station unit handles semi-finish boring, while a 10-station, 8-head transfer machine does the precision boring ahead of honing.

▶ Seen here is one of the Sheffield Precision automatic gaging machines for grading and marking cylinder bores after honing. It will be noted that each unit gages all eight bores simultaneously.



Below is the three-way Sundstrand milling machine near the end of the cylinder block line. Its function is to take a finish-milling cut on the top and banks to rectify these surfaces prior to honing.

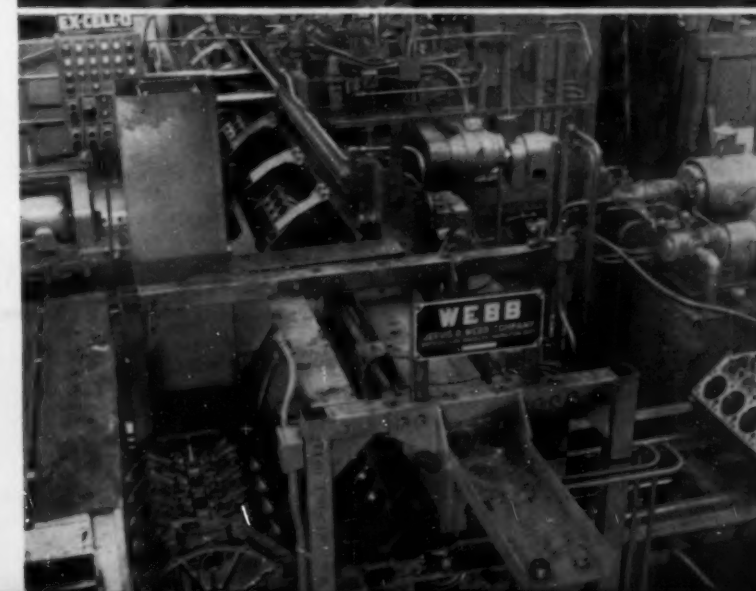
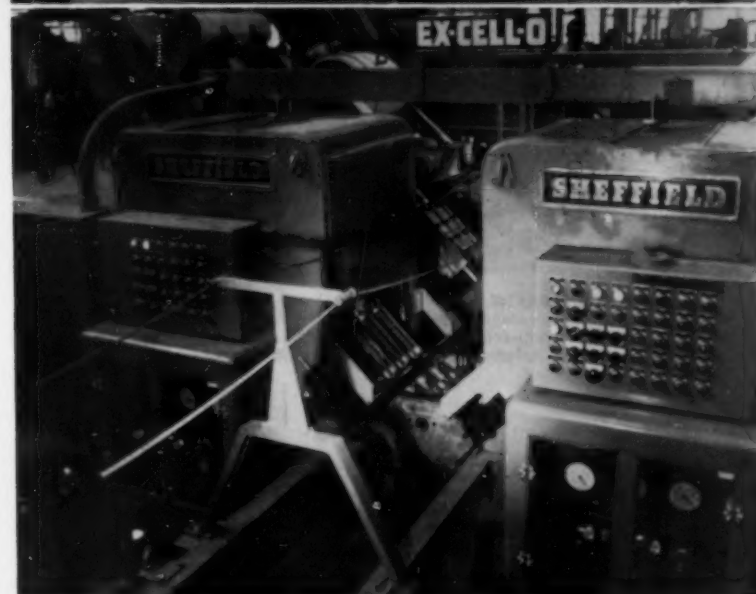
The ends of the various lines on the cylinder block at the finish end are interconnected by means of J. B. Webb automation, seen partly in view below. Ex-Cell-O transfer machines shown in background.



*Illustrated*

• PLYMOUTH •

CYLINDER BLOCK  
LINES



ends of block, core drill cam bores, drill two oil gallery lines, drill all hones in both ends.

Third stage: 29-station, 28-head Greenlee—machine ends and bank faces, pressure test oil gallery lines, drill tappet holes, drill head stud holes, drill and ream dowel holes in both banks, tap holes in bank faces and both ends.

Fourth stage: 28-station, 35-head Greenlee—machine top, left and right hand banks, sides and bottom; drill oil line holes; drill oil filter pad; drill welch plug holes; drill water drain holes; tap.

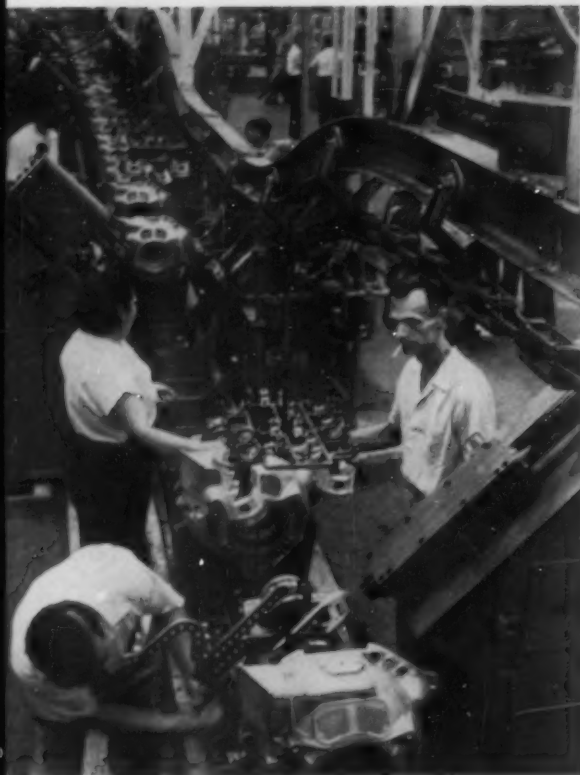
Fifth stage: 22-station, 24-head Greenlee—machine top, bottom, sides of block; drill and rough-ream distributor and oil pump bores; drill oil pan stud holes; tap.

From this point on, the block moves as a sub-assembly and finishing operations are handled by Ex-Cell-O. Among the equipment on the final section of this line is a 16-station, 14-head Ex-Cell-O transfer machine for semi-finish boring and chamfering of cylinder bores; and semi-finish machining the valve tappet holes. This is followed by a 10-station, 8-head Ex-Cell-O for precision boring of cylinder bores.

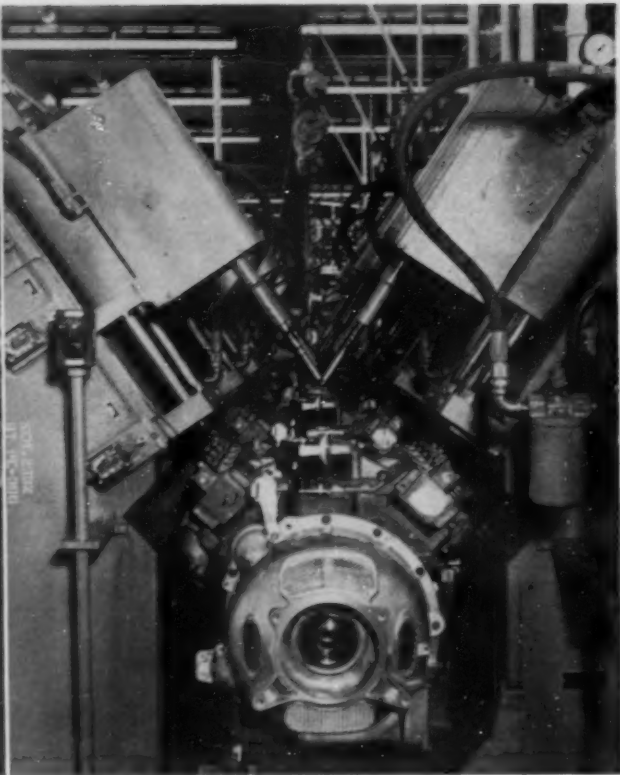
Following precision-boring, the blocks pass through a three-way Sundstrand milling machine which takes a finishing cut on the top face as well as both banks in preparation for honing. Bores are finish honed in a battery of Barnesdrill honing machines.

It may be noted that automation has been introduced at the various points where the end of one section of a line is connected to another section so as to produce smooth flow of work without manual handling. Generally speaking, the Greenlee sections of the line have made their own automation, while Ex-Cell-O has installed J. B. Webb automation.

In keeping with current practice each of the transfer machines incorporates stations for automatic inspection of critical operations, making each set of operations



Perspective of the Cross Transfer-matic machine that constitutes the engine final assembly line. Overhead is the monorail feeder conveyor supplying parts to this line. In the background are some of the automatic nut running stations.



Close-up of one of the largest nut runner stations on the engine assembly line. This Cross unit tightens ten fastenings for cylinder heads on each side, reducing the operator's function to the installation of component parts.

self-checking. In addition, Sheffield gaging machines have been employed for a variety of precision gaging operations, including—inspection of tappet bore size; and grading of cylinder bores after honing.

Another noteworthy feature is that all transfer machine inspection stations as well as other gaging equipment have been painted a characteristic yellow color to quickly identify them.

As blocks and heads emerge from the machine lines they are ready for final assembly on the special assembly machines mentioned earlier. Assembled engines then are ready for final testing for acceptance. As engines proceed to the test area, they move through a large electrostatic paint spray booth where they are painted automatically. The booth is provided with a water back as well as a cascade of water under the floor to catch overspray. Before the water is per-

mitted to return to the recirculating tank, it goes through a large Delpark filter for removal of paint residue.

Engine testing is done in a compact area provided with three separate test sections, each one having a battery of 24 automatic test stands—72 test stands in all. Here again is a Plymouth "first"—fully automatic test stands that do not require operator attention, with movement of engines along the conveyor line fully automatic. This entire arrangement was developed and installed by Nankervis.

Engines are mounted in special stands on the conveyor line and move around the closed circuit of each bank of test stands. As a test stand is vacated, the engine near that point approaches the cross conveyor leading into the stand, automatically disengages the

#### **MPA to Hold Meeting, Show In Cleveland During April**

The Metal Powder Association has announced that it will hold its twelfth annual meeting and 1956 Metal Pow-

der Show in Cleveland, O., at the Hotel Cleveland on April 10 to 12, 1956.

The meeting, open to the public, deals with all aspects of the field of

powder metallurgy. The show will display the latest developments of the powder suppliers, parts manufacturers and press, furnace, and other equipment manufacturers.

*Illustrated*

• PLYMOUTH •

## FINAL ASSEMBLY AND TESTING



Here is a view of a portion of one of the banks of 24 Nankervis automatic engine test stands. Plymouth will have 72 such stands in operation. Assembled engines are transported automatically on the conveyor seen here. As an en-

gine approaches a vacant test stand, the pallet is automatically disengaged from the conveyor chain and is moved into the test stand. Every phase of test stand operation is automatic, including the hook-up of all service lines.

automation conveyor, then is moved automatically into the test stand. Just as soon as it is within the test stand and properly aligned, the harness automatically engages and makes up the connections for water, oil, natural gas, and exhaust gas. Test procedure then is initiated and the engine is run through an established cycle for 20 minutes.

At the end of this period, the stand stops, a light goes on and the inspector gives the engine a quick check. He then presses a button, the engine is disconnected, and is permitted to leave provided the test results have been satisfactory. Accepted engines move out of the test stand and automatically seek the next open space on the automation conveyor for the return trip to shipping. It may be noted that when a tested engine and pallet assembly returns to the automation conveyor it engages a different locating pin to prevent

it from attempting to return to a test stand while moving around the circuit.

Plymouth engineers have not found it necessary to resort to final balancing of the assembled engine. Reliance is placed upon precision balancing of major components as well as the machining procedure that provides connecting rods and pistons of uniform weight.

During machining, crankshafts are balanced to a tolerance of  $\frac{1}{4}$  oz in. at each end. They are rebalanced as a sub-assembly with flywheel or torque converter, depending upon the type of drive specified by the customer and here balance is held to  $\frac{1}{2}$  oz in.

*This article is the second of three devoted to the new Plymouth engine plant. The third will appear in an early issue of AUTOMOTIVE INDUSTRIES.*

### **Ford Liquidates Des Moines Manufacturing Facility**

Ford has liquidated its wholly-owned manufacturing subsidiary, Wood Bros., Inc., Des Moines, Iowa.

The operations there now will be carried out by a newly-established unit, to be operated by Ford's Tractor and Implement Div., which has been integrating all farm machinery activi-

ties during the last year or so. The new unit will be called the Des Moines Implement Plant, will occupy the former Wood Bros. facilities, and continue with harvesting equipment.

## Hudson Offers NEW

LARGER

V-8

ENGINE



Hornet V-8 hardtop features a V-shaped grille and a 352 cu in. engine

### GENERAL SPECIFICATIONS—1956

#### Hudson Wasp and Hornet Series

ENGINE	WASP (6-Cyl)	HORNET (6-Cyl)	HORNET (V-8)
No. of cyl. arrangement	6, L-head	6, L-head	8, Overhead valve
Bore and stroke (in.)	3 x 4½	3½ x 4½	4 x 3½
Displacement (cu in.)	262	306	352
Compression ratio	7.5:1 (Opt. 8.0:1)	7.5:1	9.55:1
Max. brake hp	120 @ 4000 rpm (Opt. 130 @ 4000)	165 @ 3000 rpm (Opt. 175 @ 4000)	220 @ 4600 rpm
Max. torque (lb-ft)	180 @ 1400 rpm (Opt. 185 @ 1000-3000)	264 @ 1800 rpm (Opt. 275 @ 2000)	325 @ 2200-2500 rpm
Type of carburetor	Down-draft, single throat	Down-draft, dual throat (Opt. single throat)	Down-draft Twin-throat
No. of carburetors	One (Opt. two)	One (Opt. two)	One
No. of main bearings	Four	Four	Five

**H**UDSON Motors' 1956 Hornet and Wasp models feature distinctive styling, inside and outside, and a new 220 hp V-8 engine.

The new Hudson passenger car line includes a custom four-door sedan and two-door Hollywood hardtop in the Hornet V-8 series; a super and custom four-door and custom two-door Hollywood hardtop in the Hornet "Six" series; and a four-door sedan in the Wasp series.

All models are equipped with a 12-volt electrical system which is said to insure better ignition performance, higher generator output, and higher engine cranking speeds.

The new Hudson Hornet V-8 engine, developing 220 hp, has a compression ratio of 9.55 to 1 and a displacement of 352 cu in. This overhead valve engine also features a new high-lift camshaft and a twin-throat downdraft carburetor.

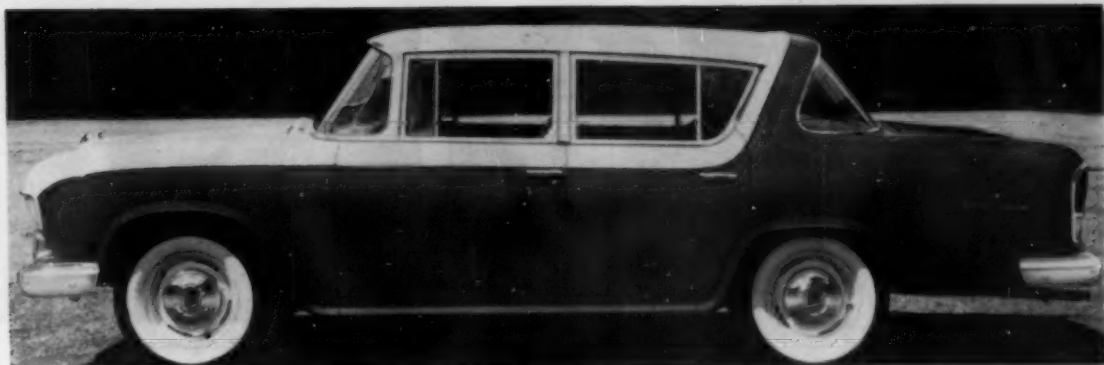


Wasp four-door sedan which is powered by an L-head six-cylinder engine developing 120-hp as standard equipment or 130 hp with optional Twin H-Power

The Hornet Championship Six, with new hydraulic valve lifters and an improved camshaft design, is offered on all new Hornet models. Its horsepower has been increased to 165, with a compression ratio of 7.5 to 1. The Championship Six also is offered with "Twin H-Power," delivering 175 hp, available as standard equipment on custom models and optional on super models.

The Wasp is powered by the Hi-Torque six-cylinder, L-head engine developing 120 hp, with a compression ratio of 7.5 to 1. This engine also is offered with "Twin H-Power" as optional equipment, increasing the horsepower to 130, with a compression ratio of 8.0 to 1.

Four transmissions are available on the new models. Syncromesh transmission is standard equipment on all 1956 models equipped with six-cylinder engines. Automatic overdrive and Dual-Range Hydra-Matic are offered as extra cost optional equipment on all Hudson Six's. The newly improved Twin Ultra-matic is available only on Hornet models powered by the new V-8 engine. New "Selecto-Lift" starting is used on all models equipped with automatic transmission. (Turn to page 129, please)



Rambler four-door super sedan



The 1956 four-door hardtop

## Rambler Has New Overhead Valve Engine

**T**HE 1956 American Motors Rambler offers more interior room and trunk space, larger window area, and improved riding qualities. Increased power and performance are provided by an entirely new overhead valve engine. The new cars have a 12-volt electrical system.

A fresh styling approach gives an impression of increased exterior size, but the car has actually been lowered 1½ inches and exterior width reduced two inches. The 108-in. wheelbase remains unchanged.

The roof panel is shallow and flat, permitting the glass area to be extended upward for an over-all increase of more than 30 per cent. Windshield area is increased more than 52 per cent; the rear window is 41 per cent larger. Window posts are narrow and vertical to provide an almost uninterrupted sweep of vision. Added rear seat vision results from the swept-back rear pillars which are set flush with the body panels and arch upward and around the enlarged rear window. An ovoid-shaped grille contains low-set inboard headlights, with running lights placed high on the fender line.

Although overall width of the Rambler has been decreased, there is an increase in interior width at the belt-line. Shoulder room is increased more than five inches in front and back. Rear seat legroom is increased 2½ inches. The trunk area is increased 25 per cent in luggage capacity.

Design of the new Rambler engine features an overhead valve system, downdraft carburetion, iso-thermal six-port manifold, and wedge-shaped combustion chambers. Rated at 120 hp, the engine

### Condensed Specifications of NEW RAMBLER ENGINE

1956 RAMBLER	
No. of Cylinders .....	Six
Bore and Stroke (in.) .....	3½ x 4¼
Displacement (cu in.) .....	195.6
Valve Arrangement .....	Overhead Valve
Compression Ratio .....	7.44:1
Cylinder Head Material .....	Cast Iron
Carburetion (Downdraft) .....	Single-Throat
Carburetors, Number .....	One
Horsepower, BHP .....	120 @ 4200
Torque, lb. ft. ....	170 @ 1600
Electrical System .....	12-Volts
Type of Fuel Required .....	Regular

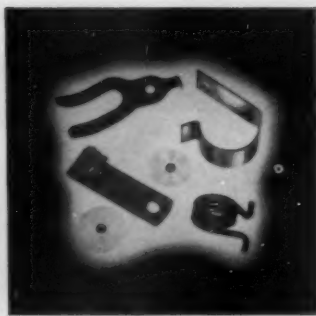
has a displacement of 195.6 cu in., and a compression ratio of 7.44 to 1.

A torque tube type drive, featured in American Motors' senior cars, is incorporated in the '56 Rambler.

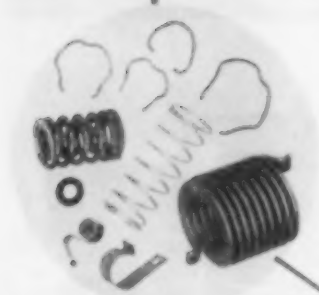
Improved riding qualities result  
(Turn to page 129, please)



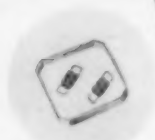
Headlight spring and clip



Speedometer and dash clips-parking lock spring



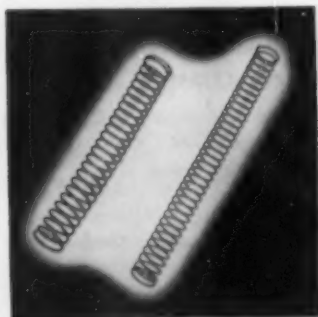
Springs in engine parts: distributor, carburetor switch, accumulator piston, ignition, cam, ring retainer, starter, hose clip, cylinder cap, valves, thrust washers, electric motors, piston stops.



Springs for air vents



Seat adjuster



Pressure regulator springs



Anti-rattle spring



Balljoint suspension

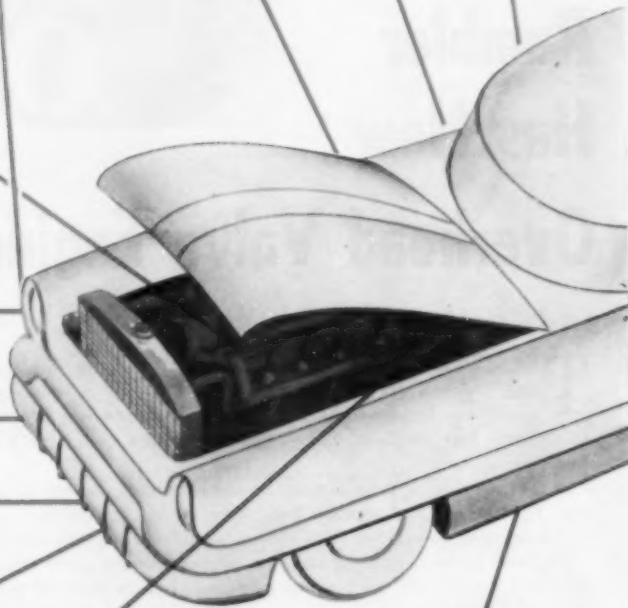
Flat and coiled springs used in automatic and manually-operated transmissions



Clutch springs

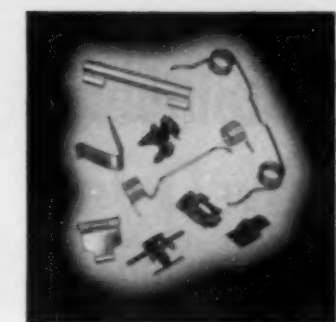


Shift rod and file rod



# Modern Cars Depend on Hundreds of Springs

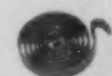
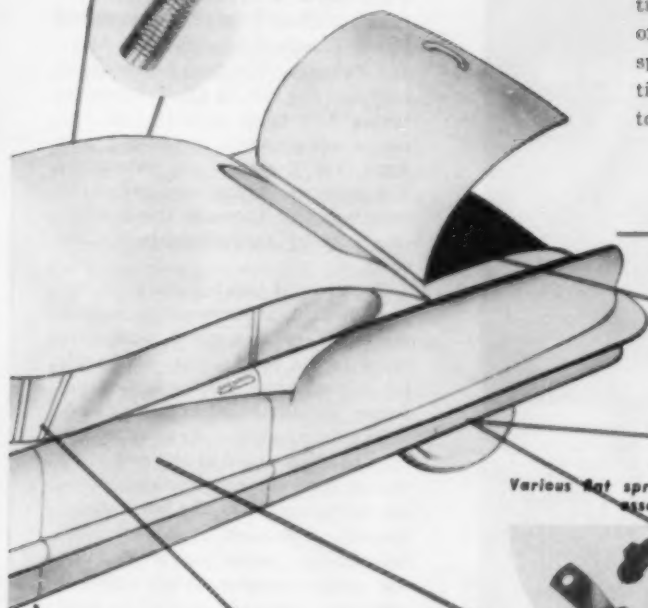
APPROXIMATELY 100 different springs of various types and sizes are used for current passenger cars. Most of these springs and their related function are shown in the illustration. The principal exceptions are suspension springs, both coil and leaf. Some of the objects shown may bear slight resemblance to springs as commonly known, but either through function or material, their manufacture is ideally suited to springmaking methods and equipment.



Body trim and molding clips



Curb fender spring



Trunk balance spring

Various flat springs used in brake assemblies



Gasoline gage wire forms

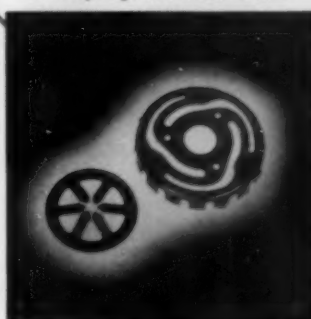


Coiled springs used in brake assemblies

Retainer rings for automatic and manually operated transmissions



Flat springs for horn button

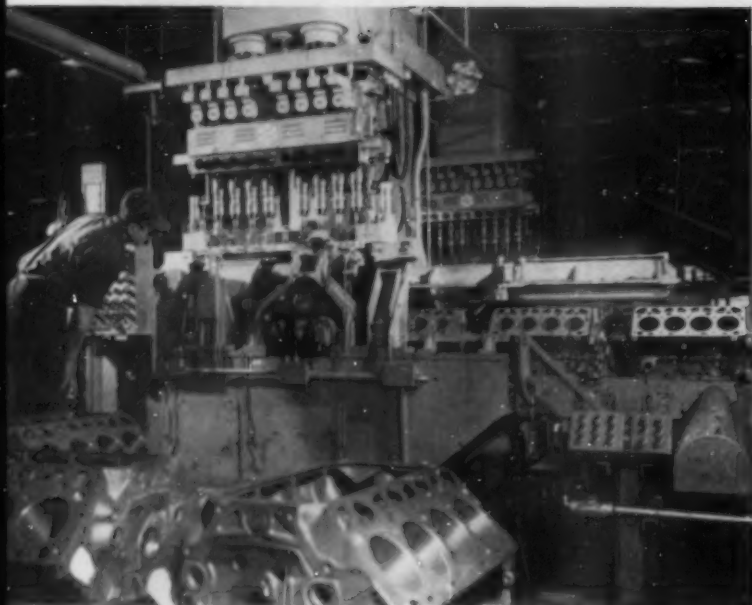


Window and door springs



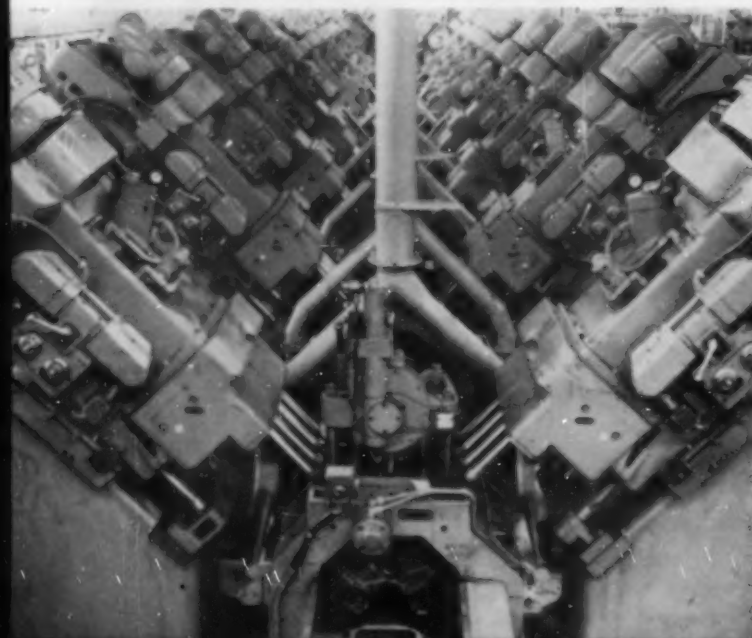
# Ford's New Engine and Stamping

## ENGINE PLANT •



*Micro-Matic honing machines put the finishing touches on cylinder bores in Ford V-8 engine blocks at the engine plant. The eight-cylinder blocks are tilted so that the machine may hone the cylinder bores in a vertical motion. The block is then transferred to the next station, and the tilting action is reversed so that the second bank of cylinder bores also is honed vertically.*

*This 17-station Footburt transfer machine automatically drills, chamfers and finish reams holes in V-8 cylinder blocks at the new engine plant. The tubes in the center of the machine remove all cast iron dust from the area. Dust extracting systems are located in all cast iron machining areas.*



## Engine Plant Facts . . .

**N**EWEST of four Ford Motor Co. manufacturing operations in the Greater Cleveland area, Engine Plant No. 2 is located on a 147-acre tract of land that also embraces Ford's Cleveland Engine Plant No. 1 and Foundry. The new engine plant contains 562,000 sq ft of manufacturing floor space and its 2100 employees are presently producing only Ford V-8 engines. An expansion, now underway at the west end of the building, will increase the production area by approximately 300,000 sq ft.

The greatest single automation improvement in the new plant, according to Ford executives, has been made in the drive units. Hydraulic oil is now used as the motivating power for all transfer mechanisms.

Engine assembly operations also have been advanced at the new plant with a conveyor line containing ample storage space as the latest development. Composed of 14 overhead independent "power and free" units, the unique conveyor system makes it possible to continue production even though one segment of the line may be down for repairs.

Another interesting feature in the assembly area is the huge control panel with red, orange and white lights and a multi-colored schematic drawing of the assembly area. The control panel gives supervisors a complete picture of what is happening the length of the more than mile-long engine assembly conveyor system. Located adjacent to the assembly area are 44 hot test stands on which each engine produced in the plant is tested.

A TelAutograph communication system has been installed with a sending station at the beginning of the engine assembly line, and three receiving units at strategic locations

# Facilities at Cleveland

in the plant where engine components are placed on conveyors for delivery to engine assemblers.

## Stamping Plant Facts . . .

Featuring the latest techniques of automation, elaborate material handling devices and modern quality control methods, Ford Motor Company's giant new stamping plant for Ford, Mercury, and Lincoln parts is located 14 miles southeast of Cleveland, O.

Over 3800 persons are employed at the plant which occupies a 111-acre site and encompasses 1,334,000 sq ft of manufacturing floor space. A 215,000 sq ft addition is currently under construction at the south end of the plant. This addition is expected to be completed early in 1956.

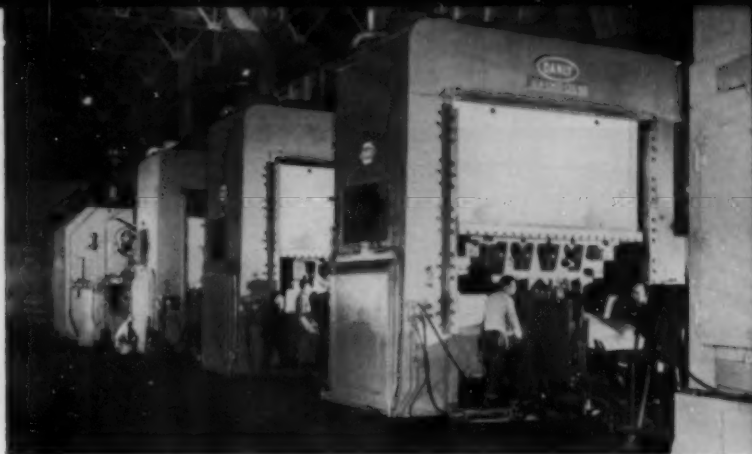
Automation and presses are cycled by new drop-cam electric controls which send all units into action at precisely the correct moment. Employees guide the stampings, adjusting pieces where necessary. All automation has been standardized to permit easier maintenance with interchangeable parts.

Twenty-two major press lines with 107 large presses do the bulk of the work in the stamping plant, but are supported by hundreds of smaller presses, welding machines and tool and die equipment.

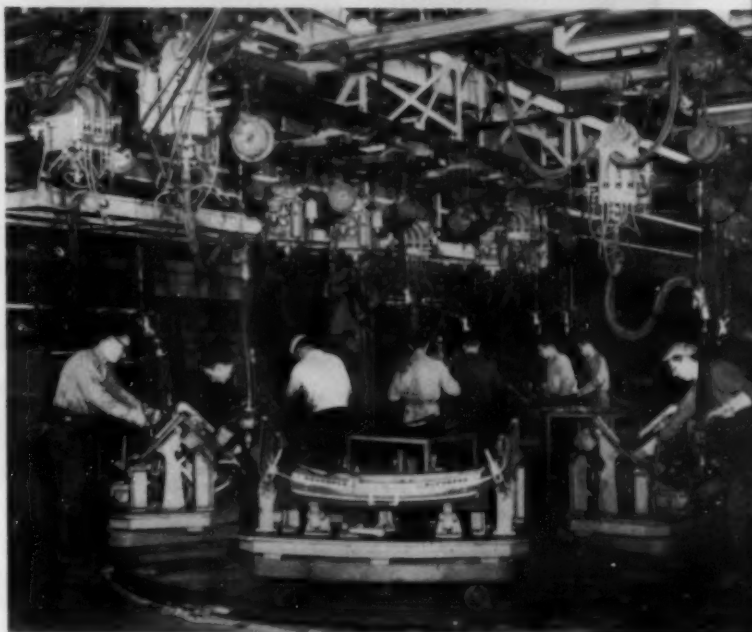
An elaborate overhead conveyor network works in conjunction with automation devices in moving stampings through production processes and to shipping docks. A series

(Turn to page 126, please)

*Automated lines carry automobile body stampings through welding operations in the stamping plant. Conveyors and transfer devices link welding operations with presses at the new plant. In the background, the work is processed in a Link welding press.*



*Ford passenger car hoods move down a battery of Danly presses which is just one of the 22 major press lines at Ford's new stamping plant. The new plant features 107 large presses, some of which weigh more than 400 tons. Ford, Mercury and Lincoln passenger car body parts are produced here.*



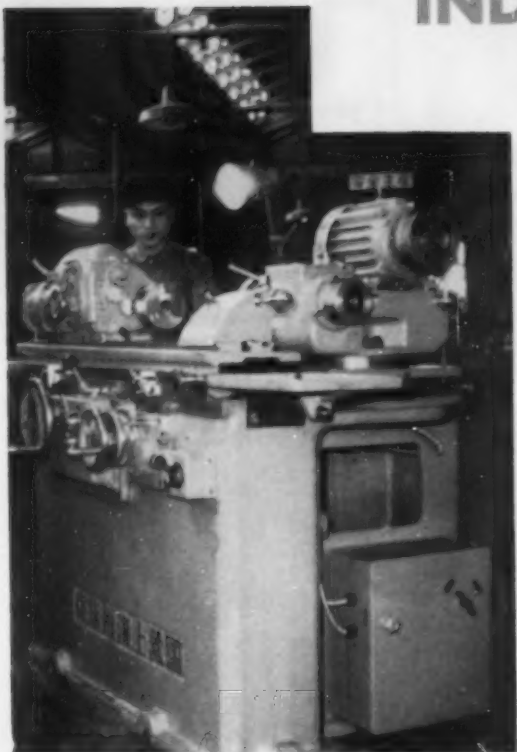
*Passenger car cowl tops move through a series of welding operations on an industrial "merry-go-round" at the new Ford stamping plant in Cleveland. As the stampings revolve, employees weld sub-assemblies in place with batteries of overhead welding guns which hang from monorail conveyors. Nine welding guns are used on the cowl top merry-go-round.*



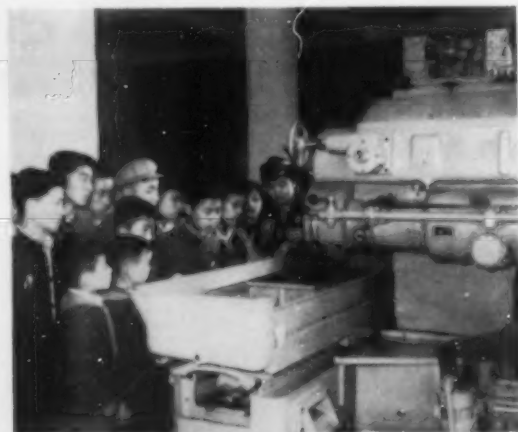
# INDUSTRIALIZATION

## Behind the BAMBOO CURTAIN

合



This Soviet-designed universal cylindrical grinder is in production at a Shanghai machine tool plant. It is being supplied for the processing of precision tools at the Changchun automobile plant and the tractor plant now in the process of construction. Shanghai is now producing in volume four types of Soviet standardized surface, crankshaft, and cylindrical grinders.



Five points of a precision grinder, made by the Shanghai machine tool plant and supplied to the Changchun automobile factory, are explained to a group of students by a female technician. Women are playing a major role in China's engineering activities, and many are being trained for work in the Changchun plant.

**CHINESE Industrialization Concentrated in Automotive Field with Automobile Plant Nearly Completed. Tractor Plant Construction Begun and Aircraft Manufacturing Facilities Planned. Russians Lend a Big Hand in Providing Material and Technological Assistance**

**I**MPORTANT projects now underway in China are to provide the country with its own modern industry turning out automobiles, tractors, and aircraft. The first automobile plant is in an advanced stage of construction, work has begun on a tractor plant, and it was recently reported from Peking that experimental manufacture of the first Chinese-made airplane had proved successful.

The automobile plant is being built at Changchun, a Manchurian city roughly midway between Shenyang and Harbin, China's two largest and industrially most important centers in the northeast. Construction began in July, 1953, and most of the building work has now been completed.

The plant is scheduled to produce 4000 trucks in 1957. When it comes into full operation in the early years of China's second five-year plan (1958-62), it will turn out 30,000 vehicles a year, mainly trucks.

The Changchun plant is one of a number of key heavy industrial projects included in the current Chinese five-year plan which was launched in 1953 and is to end in 1957. Known as the Number One

By R. W. Westgate



One end of the machine tool shop of the Harbin Cutting and Measuring Tool Plant.



A precision boring machine in an instrument shop of the Harbin Measuring and Cutting Tool Plant.

Car Plant, it is to be followed by construction of a second, Number Two Plant which will have double the capacity. Thus, the two completed projects will give the country an annual output of 90,000 vehicles as the nucleus of an industry which is ultimately to be developed to a point where it will make China self-sufficient in car and truck production.

China's automotive industry in the past was confined to the manufacture of automobile parts. Such a factory established under the Kuomintang reached a peak output in 1944 of some 200,000 parts which represented more than 100 items of automobile accessories.

Apart from the above factory and some tire retreading shops in various parts of the country not occupied by the Japanese, there were several motor vehicle rebuilding establishments and a factory in Kweiyang which began making bodies in 1944. All these enterprises sprang up following the fall of Burma in 1942, which cut China off entirely from imports of motor vehicles.

Actually, the first automobile and tractor made

entirely in China appeared at a Tientsin industrial exhibition in late 1951, but neither was put into regular, let alone quantity, production. The car was a product of a Tientsin factory and the tractor (a heavy track-type) came from a heavy machinery plant in Taiyuan, Shansi Province.

Jeeps and station wagons were also subsequently made at the Tientsin factory. A Western visitor in China at the time of the Tientsin fair described the car on show as "a bright red four-seater with stars on the hood, rather like an older Studebaker model."

China's first five-year plan is an initial blueprint for the long-term objective of an advanced industrialized country. During the five years, nearly 700 major industrial projects are to be built or reconstructed, 156 of them with extensive Soviet assistance.

These 156 projects, which include the Changchun automobile plant, form what is officially called "the core of industrial construction in the first five-year plan." Building work is to begin on 145 of these schemes before 1957, and design work on the others will also be undertaken by the same date. According

*At the present time China's automobile industry, aside from the manufacture of parts, is confined to repair and assembly operations. This plant, located in Urumchi, can repair or assemble over 2000 vehicles a year and employs 1500 workers.*

to an official of the State Planning Commission, the two automobile plants will "lay the foundation for China's motor car industry."

The Changchun plant is being built on formerly empty land on the outskirts of the Manchurian city. Total area of the plant and auxiliary buildings is about four square miles. Included in the plan are 100 blocks of four and five-story structures. The new factory town is to have its own department stores, parks, theaters and schools. Also planned are a hospital and a technical school for 1000 students.

About 30,000 workers, including 10,000 from Shanghai alone, have converged on the site from all parts of the country. Over 70 factories throughout China have been working on orders for the plant for the past two years. On the construction job itself mechanization of over 60 per cent of all operations has set new records for China. Prefabrication has been employed on a far larger scale than ever before in the country's history.

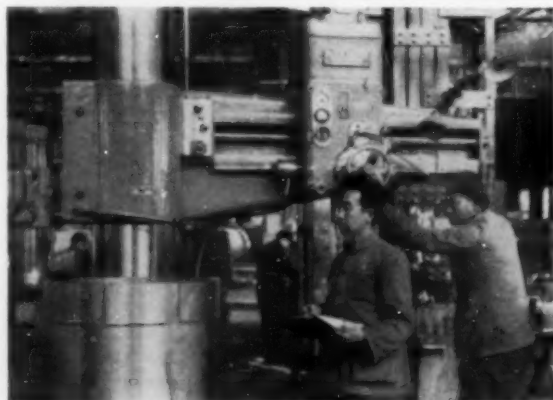
The project has been widely cited in China as an outstanding example of the "many-sided" nature of Soviet aid to the country. Soviet experts and technicians have, in fact, been associated with every stage of construction—the preliminary surveying and selection of the site, assembling data for design, the design itself, supply of equipment, direction of the work as it proceeds and the installation of machinery. Soviet engineers, it has been announced, will also supervise starting up of the plant, and eventual production will be on the basis of technical in-

*(Turn to page 106, please)*

*The Hungarian radial drill shown here in a plant for heavy machinery in Shenyang typifies the way in which Soviet and East European factories are contributing to China's industrialization. Chinese machine tool plants, however, are scheduled to contribute a significant quantity of the equipment for the Changchun mobile plant.*



*Chinese technicians install a Soviet machine at the Harbin electric instrument factory which is to produce electric meters at the rate of one every minute. The plant has been built in accordance with Soviet designs and is to be equipped with Russian machinery.*



# Advances in AIRCRAFT HYDRAULIC EQUIPMENT

BY  
JOSEPH GESCHELIN

**Users and Suppliers of Hydraulic Components Meet at Conference in Detroit Sponsored by Vickers, Inc.**

**T**HE 1955 Transport Aircraft Hydraulic Conference, sponsored by Vickers, Inc., held in Detroit early in November, is no longer a novelty. As usual it provided an excellent forum for frank discussion of the problems and troubles with hydraulic systems, marked another instance of an uncommon teamwork among representatives of highly competitive airline operators. In attendance this year were representatives of eight major airframe manufacturers, 18 airline operators, and a number of suppliers of hydraulic fluids and mechanical rubber products, as well as a large group of Vickers engineers.

Besides airing common problems that still require solution by the component producers, the Conference was livened by the presentation of a number of interesting technical papers of value to all concerned. Among the items for general discussion on the agenda were the following: variable displacement pumps, constant displacement pumps, constant displacement motors, seals, accumulators, hydraulic fluid, valves, hose and tubing.

If we were to sum up the proceedings in a single statement, we would report that external leaks still constitute one of the most troublesome problems facing users of hydraulic systems. Much of the comment had to do with leaks stemming from various causes, primarily in seals and O-rings. The consensus appeared to be that still more work is needed in developing improved synthetic rubber formulations, better quality control, and safer methods of storing rubber and rubber-like parts.

Some attention was given to widening use of self-aligning ball bearings in hydraulic mechanisms. Aetna reported progress in the adoption of the technique of sub-zero chilling of bearing races to stabilize physical properties and structure.

In seeking teamwork among airframe manufacturers, component producers, and airline operators, P. A. Hartline, Trans World Airlines, presented a



paper dealing with an analysis of causes for flight delays and cancellations, and an analysis of basic system design deficiencies experienced with existing hydraulic systems. He followed this by a review of these findings as a clue to what may be done to improve the reliability and performance of hydraulic systems. According to Hartline 68 per cent of all failures with TWA equipment have been due to external leakage of fluid. He also reported inadequacies in hydraulic system analysis which should be investigated by airframe manufacturers.

Based on current experience, Hartline strongly urges measures for reducing fluid leakage to a minimum. Among the remedies he recommended a reduction in the number of fittings employed and suggested wider use of package units which would combine a number of components into a single assembly. One of the major causes of leakage, according to TWA, is the existence of uncontrolled pressure surges with their attendant vibration. He asked for some action to reduce the level of surges to a practical limit.

Incidentally, one area of agreement as to the probable future course of hydraulic systems was that system pressures would increase to a value of around

*(Turn to page 112, please)*

# AUTOMATION NEWS REPORT

**AUTOMATIC CONTROLS**  
PRODUCTION — VEHICLES — AIRCRAFT

By Paul Kennedy

## COMPUTERS: MODEL T

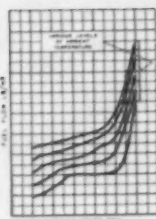
"Computers of the present day will be considered by owners of computers 20 years from now in the same way as we think of Model T's," predicted J. T. Horner of Allison Div., GMC, at a recent Armour Research symposium. Although he supervises three types of computers for handling engineering problems, he anticipates more economic and effective operations in the future. Improvements will include development of symbolic internal computer codes, larger capacity and more compact memory, and increased speed, Horner said.

## CAMS: NO HANDS

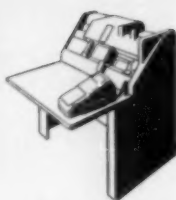
Further details have been revealed on the Bendix automatic milling machine for three-dimensional cams, reported last month. The process for making jet engine fuel control cams has been in operation for a year, and is estimated to save 200 to 400 man-hours of skilled handwork for master cams, and a more modest saving in actual production.

The machine resembles a small lathe. As the work

Flow of information from Bendix engineer's fuel flow chart to finished fuel control cam



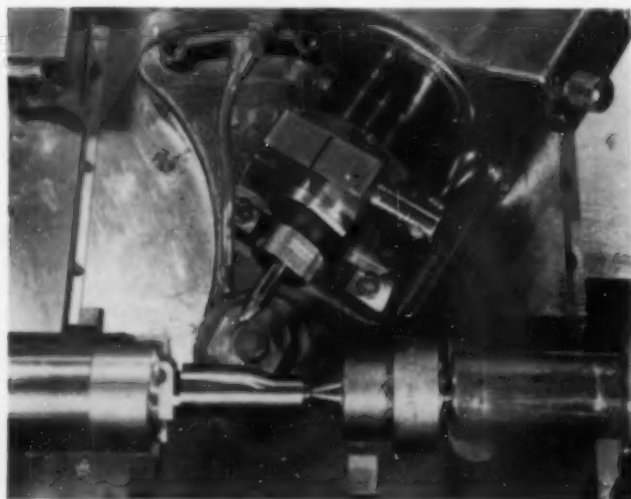
JET FUEL DEMAND



KEYBOARD

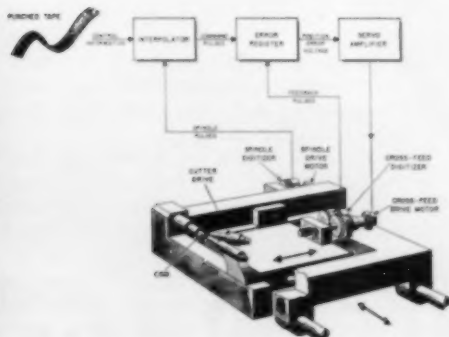
rotates, a ball-end milling cutter is fed radially in and out in accordance with control signals generated from punched tape. These signals direct a hydraulic servo-mechanism that drives the cross slide on which the cutter is mounted.

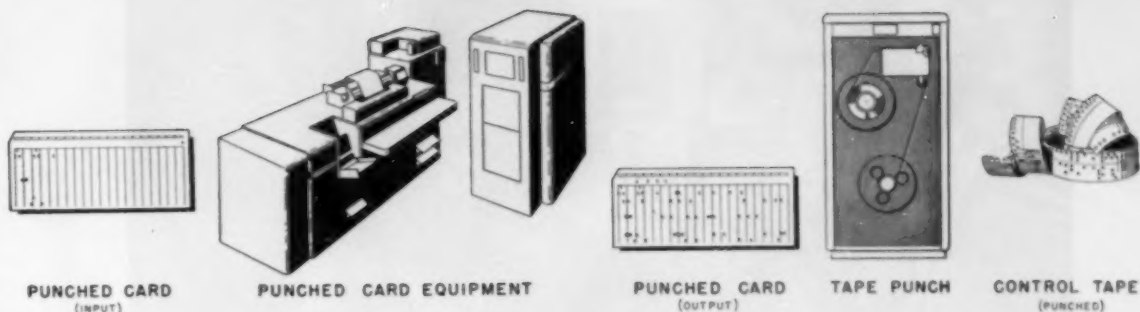
The tape-control system basically is digital in nature, operating in increments of 0.0002 in. Jet-engine fuel demand specifications, pounds per hour for various engine speeds, are charted for various levels of ambient temperature. Variable data are manually punched into cards, on the keyboard, while fixed data are wired into the punched card equipment to produce finished cards. Dimensions on the control tape are entered as a certain number of these increments, and all data manipulations (decoding of the punched tape) within the control unit are performed utilizing digital computer techniques. Final conversion from digital information to machine motion (which in a sense is a form of analogue information) occurs within the loop of the cross-slide servo. Its feedback device and error-sensing means both are digital in order to preserve the



Left—Closeup of Bendix lathe

Below—Detail schematic of control unit and lathe of Bendix machine





accuracy inherent in the digital approach.

Primary function of the machine control system is to guide the tool when it is cutting between the data points supplied by the tape. This function—essentially an interpolation—is performed in such a manner as to connect given points with arcs of a spiral. The machine, therefore, requires relatively only a small amount of input data compared to that needed to generate the surface by specifying a sufficient number of separate cutter positions.

A surface finish approximately of 15 to 25 micro-inches rms is produced at spindle speeds up to 40 rpm. Overall accuracy of the process, from drawing to finished cam, may be held to less than 0.001 in.

In addition to this unit, Bendix has in the works a numerically-controlled milling machine for Glenn L. Martin Co. The Bendix-MIT-developed control system will be applied to a DeVlieg horizontal milling machine. Flexibility is the keynote; various engineering designs can be economically stored in the form of tapes instead of tables of data, lofts, photographs and templates. Standard arcs and other routine movements will be preprogrammed, to speed up still more the job of making tapes.

#### PRESS: SPEED CONTROLLED

Extrusion and forging presses in the Air Force heavy press program require some form of automatic speed control. The system design by Loewy-



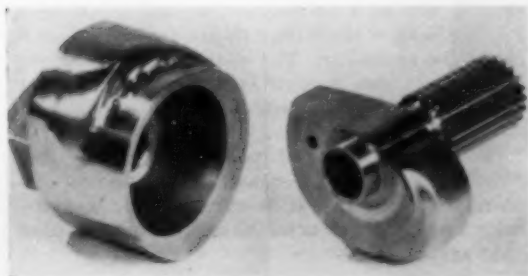
CONTROL UNIT AND CUTTER

Hydropress was outlined recently by L. Mollick, chief stress analyst. Forgings particularly require this because of small draft angles and close tolerances. As many as four speed changes varying from 30 down to  $\frac{1}{4}$  ipm may be specified at intervals in a 12-in. stroke. Desired speed is set on a calibrated potentiometer. Press speed is reflected as the voltage output of a tachometer generator. When set voltage equals generated voltage, no signal is applied to the transducer. With unequal voltages, a polarized pneumatic signal is produced which operates the positioner on the throttle valve. The desired speed of each part of the stroke is selected by a selsyn driven switch drum, which is synchronized with the press slide.

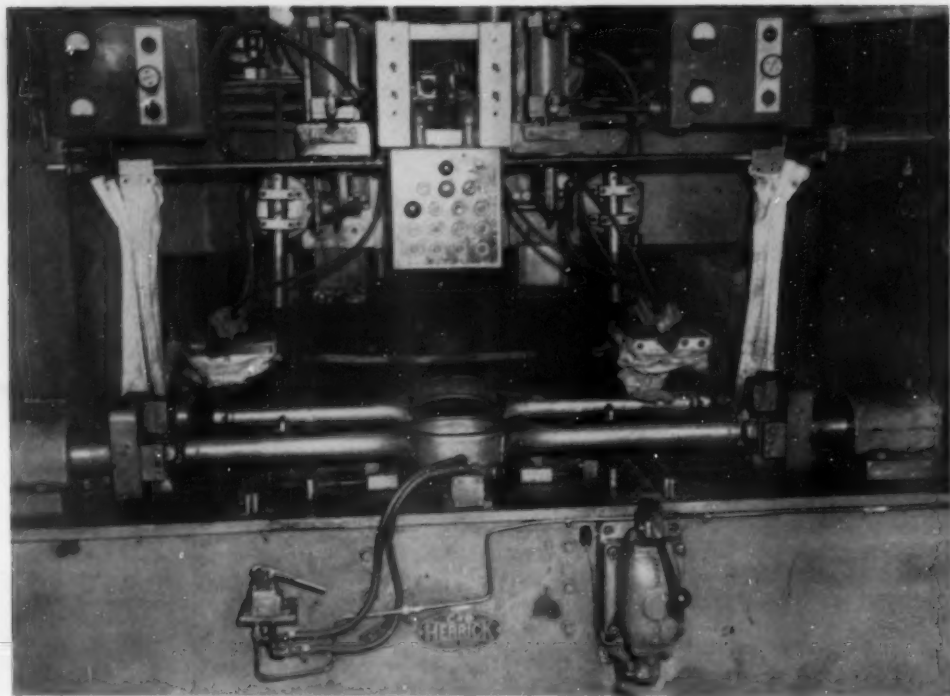
#### DESIGNERS: PUBLIC

The industrial designer must speak for the customer, the public. If he doesn't, no one else will, implied speakers at a recent design conference of the Society of Industrial Designers. Discussing the progress of automation on industrial design a round table group failed to agree on whether all product

(Turn to page 118, please)



Jet engine three-dimensional fuel control cam



Two axle housings are handled in the machine — one at the front has the flanges pressed into place, the other at the back has them welded to the housing

## AUTOMATIC MACHINE

### *Welds Flanges to Axle Housings*

**H**IGHER welding speeds, better quality welds, and lower operating costs are the main advantages of a consumable-electrode, inert-gas arc welding process developed by Westinghouse and installed at the Chevrolet-Buffalo Division of General Motors Corp.

One of the keys to the process, which uses ordinary welding grade argon to shield the arc, is a coated wire—Westing-house MS-20 wire. This wire is used with a newly designed welding gun, wire control, and a constant potential power source—the RCP, 500 amp, d-c welder.

The operation consists of pressing a housing flange onto each end of the rear axle housing and welding it in place, using a special Herrick machine.

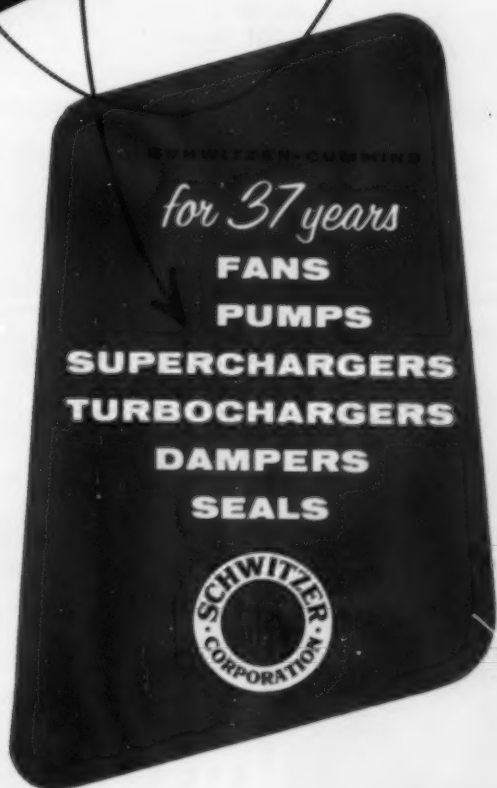
As illustrated, the machine handles two rear axle housings at a time; one at the front where the housing flanges are pressed on, and another back under the welding heads.

Very little manual effort is necessary in operating

the machine. The operator places a flange at each end of the housing and moves a lever which controls the hydraulic cylinders, causing them to press the flanges tightly in place. The housing is then moved back under the welding heads and rotated approximately 360 deg by a spindle at each end while the welds are made. Time to complete each part is 13 to 15 sec.

The control for feeding the wire has been designed to supply wire at a constant pre-selected speed under all loads. Both of the drive rolls are driven through a 1/12-hp d-c gearmotor. The electrode length beyond the tip of the gun is controlled on stopping so that neither wire nor the operator's time is wasted by trimming.

The constant potential power supply is rated 220/440-volts, 60 cycle, 3 phase. Its continuous current rating is 500 amp at 34-volt load. For this particular welding operation on the axle, the current draw is 390 amp at 25-27 volts.



**1st In a Series . . .**

**OF HIGH PRODUCTION CASE HISTORIES**

**ASK**



**BAIRD**

**ABOUT IT**



Before and after views of the machining operations performed on the Baird 76H Automatic Chucking Machine.

**8 OPERATIONS**

**ON HEAD CASE**

**OF COLD DRAWN MILD STEEL**

**Production . . .**

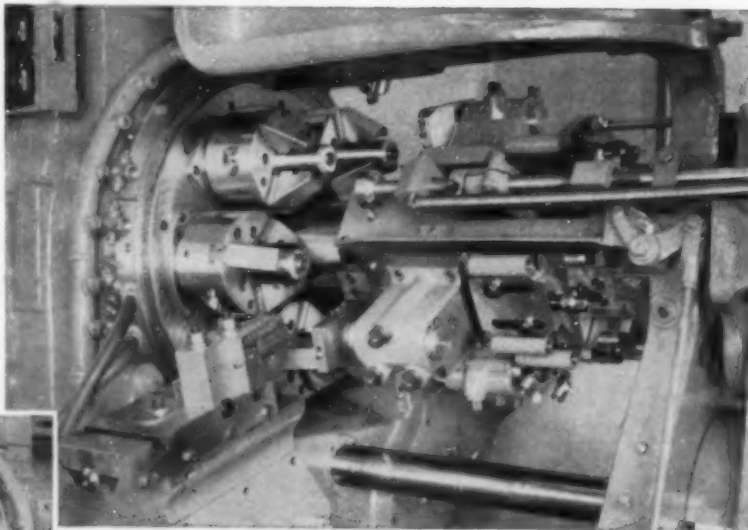
**198 PIECES PER HOUR**

The machine tooled for production of these parts at extremely low cost is the Baird 76H Automatic Chucking Machine.

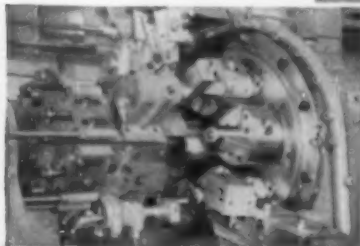
**Operations** are: rough and finish turn the smaller O.D. . . . face the shoulder . . . rough and finish larger O.D. for threading . . . face the end, cut recess for threading die and chamfer the ends. Prevention of tool marks on the finished surfaces is assured by indexing the work away from the tools at the conclusion of the cutting.

Even though you may not have Head Cases to finish, there are many similar jobs that can be produced at most favorable competitive costs on the Baird Chucker with high speed tooling set-ups.

"Ask Baird about it." Write Dept. A1.



(Above) Front view of tooling showing 4 of the 6 chucks. (Left) Rear view of the tooling.



**THE BAIRD MACHINE COMPANY**  
**STRATFORD CONNECTICUT**

WHERE YOU WILL GET THE HELP OF SPECIALISTS  
ON THESE ESSENTIAL PRODUCTION PROBLEMS:

**AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL  
FORMING MACHINERY • AUTOMATIC FINISHING • SPECIAL TOOLING**

5BA155



# EATON Free-Valves LAST LONGER\*

## Free Floating Action—

- Wipes stem and seat free of deposits
- Keeps a film of oil on stem and guide surfaces
- Prevents scuffing
- Prevents burning and guttering
- Reduces wear
- Eliminates hot spots due to local leakage



Performance records covering engines of all types in all kinds of service prove that Eaton Free-Valves increase valve life many times over the ordinary life expectancy of conventional valves.

Eaton Free-Valves can be applied to engines of all types and sizes, without costly design changes. Our engineers will be glad to discuss Eaton Free-Valves with you.



# EATON

— VALVE DIVISION —  
**MANUFACTURING COMPANY**  
9771 FRENCH ROAD • DETROIT 13, MICHIGAN  
General Offices: CLEVELAND, OHIO



**PRODUCTS:** Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings • Springtites® • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers



On the assembly line of the auto industry's newest V-8 engine, specially designed

Johnson main bearings fit perfectly into position with a touch of the fingers.

## Read Why The Makers Of This New V-8 Chose Johnson As A Supplier Of Bearings

Months before the introduction of this new engine, Johnson engineers were called in to consult with automotive engineers in the customer's plant on specifications for bearings in crankshafts, connecting rods and camshafts.

All connecting rod and main bearings were specified as *super micro-babbitt* with *steel backs*. *Lead base babbitt* was selected except in the flanged No. 3 main bearing which takes the thrust. This bearing was to be *tin base babbitt* which gives excellent resistance to wear under thrust loading.

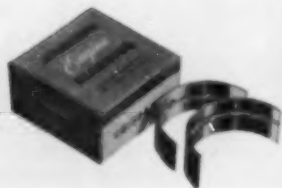
Trial lots of bearings were subjected to exhaustive testing in the research lab and on the proving grounds.

Result? Johnson met the specifications perfectly and was awarded a large share of this customer's bearing needs. Receiving and inspection men, supervisors, and workmen welcome the arrival of Johnson Bear-

ings on the assembly line because it means uninterrupted production—less headaches for all concerned.

Johnson supplies original equipment engine bearings to the leading automotive companies because Johnson can be depended upon to deliver the exacting tolerance, mirror like finishes, and carefully compounded chemical analysis of the metals required, bearing after bearing, order after order, at competitive prices.

If you have a hand in the production of engines—automotive, marine and industrial, either gasoline or diesel—and you have a problem in the design, construction or operation of bearings, a Johnson engineer will welcome the opportunity to talk it over without cost or obligation. Call, write or phone sleeve bearing headquarters, the Johnson Bronze Co., 625 S. Mill St., New Castle, Pa.



# Johnson Bearings



FOR AVOIDING HEADACHES  
*send your blue prints*  
 to **FERRY CAP**

and benefit by...

## 1 FERRY CAP KNOW-HOW

For nearly fifty years we have been making quality fasteners for quality products. We have a department for designing and making our own tools and dies. Our long experience in producing thousands of different kinds of special fasteners—satisfying customers the world over—is available to you.

## 2 FERRY CAP ENGINEERING

Our capable, experienced engineers and metallurgists are ready to assist you. These men are accustomed to solving difficult problems. Why not discuss your needs with us?

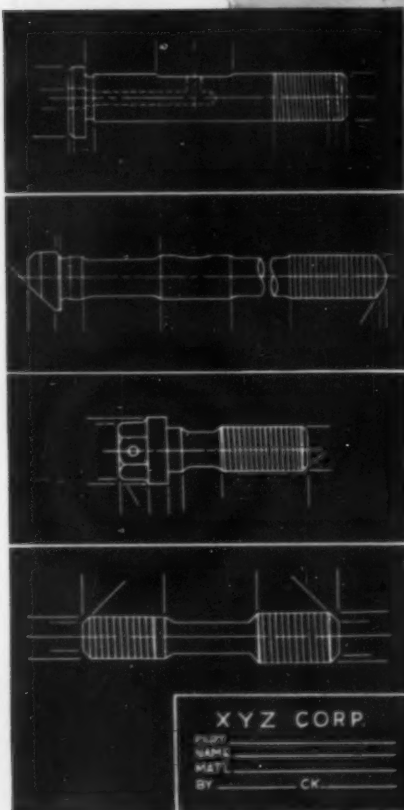
## 3 FERRY CAP INSPECTION

Our inspection system providing careful, thorough inspection at each stage of manufacture as well as of the finished product insures special fasteners conforming in every detail to customers' specifications.

## 4 FERRY CAP DELIVERY

Our raw material and production scheduling is designed for timely, mass production of special fasteners to meet customers' delivery requirements.

*Full information and quotation on top quality, competitively priced, special fasteners will go forward to you promptly upon receipt of your blueprints.*



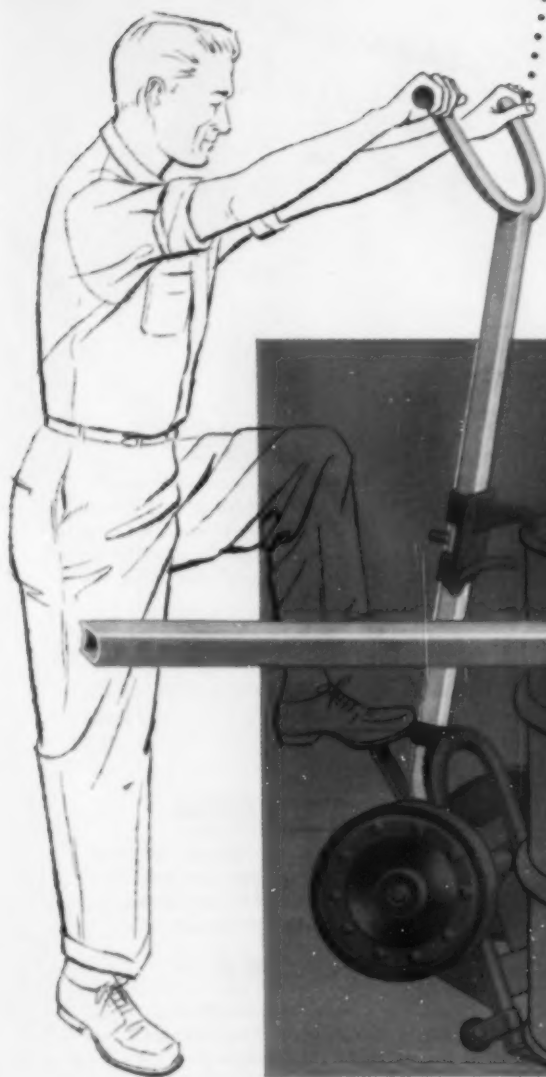
**The FERRY CAP & SET SCREW CO.**

*Pioneers and recognized specialists cold upset screw products since 1907*

2191 SCRANTON ROAD • CLEVELAND 13, OHIO

Colson cures  
barrel-truck fatigue with

## STRONGER BACKBONE FROM OSTUCO



First experimental models of Colson Corporation's barrel and drum handling truck strained, twisted and snapped under loads below their intended 1,000 pound capacity. Failures increased when the Elyria, Ohio, manufacturer tested trucks with heavy loads over rough surfaces.

Tracing trouble to the "Backbone" (the truck's main structural member), Colson and OSTUCO engineers got together, came up with a 1½" square formed seamless tube to solve the fatigue problem. Since 1947, the redesigned drum handling truck has been serving Colson customers, handling loads up to . . . and above . . . its capacity. Successful? Colson has yet to hear of one failure.

Take your cue from Colson, quality, cost and production problems work themselves out when you talk them over with an OSTUCO engineer. It's easy to start the process by contacting a nearby OSTUCO sales office, or by writing direct to the Shelby factory.

Unique Single-Source Service at OSTUCO eliminates interplant shipment and error . . . another reason why your product can be improved when components are made from



# OSTUCO TUBING

SEAMLESS AND ELECTRIC WELDED STEEL TUBING  
—Fabricating and Forging

### OHIO SEAMLESS TUBE DIVISION of Copperweld Steel Company • SHELBY, OHIO

Birthplace of the Seamless Steel Tube Industry in America

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117 Liberty Street, New York 6, New York

# News of the MACHINERY INDUSTRIES

By Thomas Mac New

**Defense Production  
for the Future, Al-  
though a Costly Pro-  
cedure, May Be Best  
Method of Assuring  
Adequate Weapons  
in an Emergency.**

## Machine Tools In the Government

Recent Government activity has put a stop to machine tool orders for the present and for the near future. Actually, the program has not been abandoned; but as they say in Government circles, it is currently under review. The trend of thought behind this recent move has been the advances made in weapons technology. It is believed that the machine tools of today will not produce the weapons of tomorrow based on the current development rate of military items. It has been stated in Government circles that the next war may be over a relatively short time after it is started, and in this case there will be no opportunity to get ready after the emergency. Therefore, it might be very necessary, according to some Government and industry sources, to continue with the machine tool program even though the tooling could become obsolete in a short period of time. In this respect, we will be constantly building toward the future; and although it is true that this is a costly procedure, we would not be caught without ample production equipment. There is no question that the best defense is a good offense.

If military strategists keep putting off the machine supply until the ultimate military weapons design have been achieved, we will never build the machine to build the weapon or the weapon itself. There should be some deadline date to establish production on a series of weapons best suited to our purposes and which require a long lead time to produce.

Also concerning the Government and machine tool companies, we came across a very interesting tidbit on renegotiation cited by the Chamber of Commerce. One machine tool company produces a unit which sells at \$10,000, including a 25 per cent profit before taxes. Another company making a similar machine in all respects sells its unit to the Government at a price of \$12,000 and makes only a 10 per cent profit. Our current renegotiation act provides that the first company would be subject to re-

negotiation while the second would not. As stated by the Chamber, the excessive price of the second company represents the cost of inefficiency. Of course, what this case boils down to is that the more inefficient and the less overall profit, the less renegotiation.

## Kaiser Ready-to-Go On Big Extensions

Operation of one of the two 8000-ton extrusion presses is now underway at the Halethorpe heavy press extrusion plant which Kaiser Aluminum & Chemical Corp. will operate under contract for the U. S. Air Force. A second gigantic press is under test and will begin production in the near future. Named "Rex" and "Regina", the presses are the first all-American-built units to be completed for the extrusion portion of the Air Force Heavy Press Program.

The presses, built by Loewy-Hydro-

press, Inc., measure 126 ft in overall length and are capable of producing almost 2 million lb of extruded structural and integrally stiffened shapes a month.

Two-story-high casting stations will produce high-strength aluminum alloy ingots up to 25 ft in length that may weigh as much as 8500 lb. The ingots are sawed into billet lengths for use in the presses.

## Major Changes on 1957 Cars to Boost Tool and Die Business

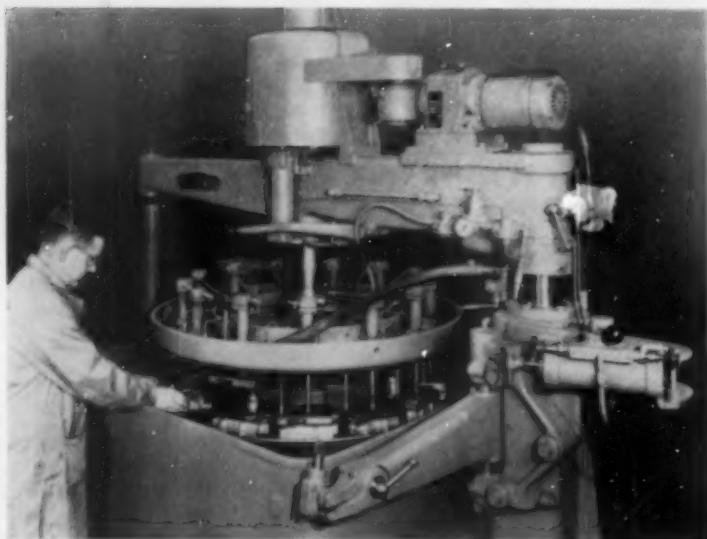
A boom is expected in the tool and die business next year. Major reason is that "radical" changes are planned by car makers on 1957 models. The National Tool and Die Manufacturers Assn. predicts business in 1956 will easily top this year's, estimated at \$700 million. Some tool and die shops look forward to tripling their business next year.



The two massive-8000-ton extrusion presses dominate the main bay in the U. S. Air Force heavy press plant to be operated by Kaiser Aluminum & Chemical Corp., at Halethorpe, Md. In the center, between the presses, are the induction heating units which prepare the aluminum alloy billets for extrusion. In the foreground are the two 7200-gal pre-fill tanks for one press. These tanks are used during the advance stroking of the press prior to the actual pressing stroke.

**NEW****PRODUCTION  
and PLANT****EQUIPMENT**

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

**Production Lapper Can Be Automatic**

Norton No. 48F Hydrolap which was introduced recently.

For either single or parallel face flat lapping, the No. 48F Hydrolap can be arranged for a plain timed cycle, automatic continuous feed, or semiautomatic continuous feed.

New features include means of handling a greater range in work piece size, a more productive rate with less operator attention, and better means of sizing control.

For single face lapping the machine mounts a single 48-in. diam bonded abrasive wheel lap on a rigidly supported, heavy duty, vertical spindle. Work pieces are retained in suitable adapters and proper lapping pressure secured through weights or pressure devices as required. Truth of the lap face is generated and maintained by a column counted diamond truing arm, operated hydraulically.

Opposed parallel flat faces can be lapped in this machine simultaneously. Work pieces are held in retainers between the two laps and sizing is controlled by raising the lower lap with a click-count indexing wheel feed ar-

rangment and rotating full nut engaging a feed screw. Both hand and power feed are provided.

The plain timed cycle arrangement uses an electric timer to control the machine cycle. The operator removes finished parts, inserts rough parts and then presses a push button to start the cycle which ends automatically. With the semiautomatic continuous feed arrangement, the operator removes finished work and replaces them with new parts as the lapping is done continuously in a single pass through the laps. The automatic continuous feed arrangement provides automatic handling equipment. This machine employs bonded abrasive wheel laps in conjunction with filtered coolant, which permits the use of optical flats for inspection because of the bright surfaces produced. Individual adjustable speed drives for both laps and the workholder provide speed combinations heretofore unavailable. Norton Co.

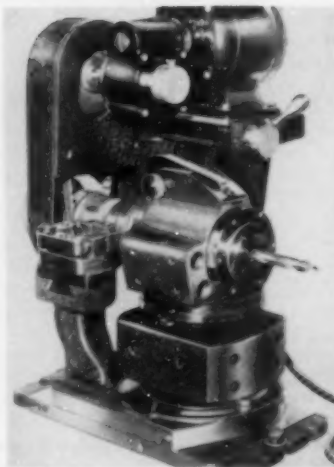
Circle 40 on postcard for more data

**Press Brakes**

CHICAGO press brakes in four new series are offered for bending and forming sheet metal and steel plate. Features include welded steel frame, and deep section bed and ram of rolled steel plate. A double-end drive from the intermediate shaft eliminates strain in the intermediate shaft providing even application over the length of the ram. The one-piece main gear and eccentric at each end rotate on hardened alloy steel shafts. All gears are precision cut steel, and enclosed. Stroke is two and three in.

A Twin Disc friction clutch and hand brake on flywheel shaft can be jogged or slipped to meet operating conditions. A split ram adjustment permits adjustment for tapered work. Many optional features are available in all models. Dreis & Krump Manufacturing Co.

Circle 41 on postcard for more data

**Grind Fixture**

For large tool grinding departments a motorized universal form relieving fixture has been designed. The compact drive will deliver a constant high torque output at any speed up to 80 rpm. A 1/15-hp reducer motor is used with a 40:1 gear ratio. (Royal Oak Tool & Machine Co.)

Circle 42 on postcard for more data

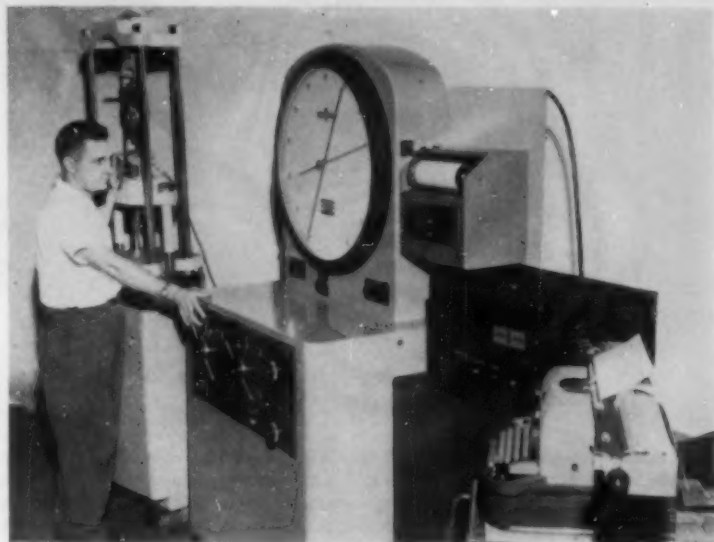
## Automatically Controlled Physical Tester Prints Results

**A**N automatically controlled physical testing machine with an automatic typewriter for printing test results was shown for the first time at the Metal Show. The machine demonstrated was a 60,000-lb capacity Super L universal testing machine. In automatic operation, all phases of production tensile tests are controlled by the built-in programmer. A separate electric typewriter automatically prints the yield strength for the selected percentage of offset, plus an identifying test number as each specimen is tested. With this unit, yield strength or other test data is determined immediately without interpolation of a stress-strain curve.

One program controller is designed for testing similar tensile specimens in rapid succession. The testing machine can be set to apply a uniform loading speed of from 0 to 3.5 ipm. A predetermined control point and a yield speed time are set on separate dials. A fast approach speed, plus a slow, "yield" speed and a very fast tensile speed are also selected. When the machine is started, it loads rapidly at the approach speed to take up the slack in the specimen. When the control point is reached (just short of the expected yield) the loading rate is cut down to the slow speed specified for the type of material being tested. This slow speed continues for the preselected time through the desired yield determination, and then the specimen is loaded at a very fast speed until it fractures. The machine repositions itself automatically.

The control points can be determined by means of an initial test or from a written record of previous settings for the same material. Once set, the same testing procedure is followed exactly until the controls are changed by the operator. In addition to production tensile testing, program controllers are currently available for production proof testing, yield strength by the extension under load method, stress (load) cycling, and crosshead cycling.

The automatic data printer is essentially a data converter and electric typewriter. The operator selects on the converter control unit, the desired percentage of offset and operates the testing machine either manually or automatically. When the electronic "stress-strain curve" intersects with the desired offset, the electric typewriter automatically prints the actual load in pounds applied to the specimen



Olsen testing machine with program controller and automatic data printer requires no stress-strain curves.

at that instant. An electronic recorder may be used to plot simultaneously the conventional stress-strain curve.

Electronic signals to operate the printing control mechanism are generated both by the extensometer affixed to the specimen, and by a null balance indicating system. The former supplies data on the amount of strain or specimen extension under

load, while the latter gives the load applied to the specimen at any instant. These two signals, converted in terms of the selected offset, print out the yield strength on standard letter sized paper. Any other information can be typed as a part of the record since the typewriter has a standard keyboard. *Tinius Olsen Testing Machine Co.*

Circle 43 on postcard for more data

### Variable Drive

**T**HE Magne-Speed line of variable speed drives is being announced. The line, consisting of Size I and Size II, covers a range from  $\frac{1}{4}$  to 1  $\frac{1}{2}$  hp. The unit features stepless instant



Magne-Speed variable speed drive

starting, no electronic components, compact design, 50:1 speed range with good regulation using simple circuitry, fast response. Reversibility,

dynamic braking, local or remote control may be specified. It may be installed without special tools or wiring. *Magnetic Amplifiers, Inc.*

Circle 44 on postcard for more data

### Tumbling Chips

**O**NE fused aluminum oxide tumbling chip is claimed to rough cut, finish, color and burnish. For cutting, the chip is cleaned and is said to retain its sharpness until reduced to dust. For burnishing, the chip pores can be loaded as required. Before screening, the chips are fracture tested by dropping onto a concrete platform. Chips above size No. 7 are pretumbled ready for burnishing. Sizes and half sizes from 00 to 3  $\frac{1}{2}$ , and all standard mesh sizes to No. 16 and finer are offered. *Lord Chemical Co.*

Circle 45 on postcard for more data



Tube burring machine meets JIC specifications, has hopper feed available

### For High Production Tube Burring

**B**OTH ends of a tube can be burred or chamfered at once on an electric, double-end burring machine introduced recently. The device also serves as an accurate high-speed centering machine. Tubing from  $\frac{1}{8}$  in. diam and 3 to 72 in. in length can be processed at rates in excess of 4500 pieces per hour. Smaller machines of the same design can exceed 7500 cycles per hour.

For radial stability the spindle is mounted in a hardened steel quill, ground and lapped to the nickel-iron housing. The spindle or the quill may be removed, jointly or independently,

with minimum effort. A special nose adapter on the spindle also makes it simple to change cutters rapidly. Hopper loaded parts are automatically ejected. Changing from one size tube to another is done quickly by removal of four screws to replace the clamps with the desired size. Clamp jaws are keyed to position, and clamping pressure is easily adjusted by nut on toggle. The movable head is quickly positioned by a hand wheel and lead screw. The threaded quill permits micro-adjustment of the cutter spindles. *Tubeo Industries.*

Circle 46 on postcard for more data

### Gear Automation

**A**UTOMATIC operation for all 1800 series Shear-Speed gear shapers including automatic size adjustments is announced. The complete setup includes automatic loading, a new gear washer for cleaning gears prior to inspection and a three-way gear classifier and control panel. Various combinations using one or more of these components can be supplied.

The automatic size control unit built into the machine and working in conjunction with the classifier control panel regulates total infeed of the radial cutting tools.

When tools start to get dull, resulting in gears being consistently oversize, the control panel shuts down the gear shaper.

The automatic loader has magazine loading and uses both an indexing rotary table and a shuttle movement. It swings to one side for tool change. Finished parts are discharged into a chute. A magnetic chip separator removes chips automatically from the cleaning fluid in

the gear washer. A clutch-brake unit installed in the drive system stops the work ram reciprocating crankshaft within one degree.

Machines already installed can be modified for fully automatic operation. *Michigan Tool Co.*

Circle 47 on postcard for more data

### Spray Booth Coat

**B**OOThGUARD is a "spray on—strip off" protective coating for spray booths and spray areas. The water-type coating is sprayed on the walls and ceilings of the booth, where it quickly dries and forms a thin white film. When paint overspray accumulates, the coating reportedly is easily stripped off the walls in large sheets, taking the overspray with it. It is non-inflammable in liquid form. This coating will not feather or web when sprayed on, nor tear or shred in small pieces when stripped off, according to the manufacturer. *Guard Coatings Corp.*

Circle 48 on postcard for more data

### Drop Bottom Box

**C**ORRUGATED all-steel welded drop bottom boxes are announced for use either with positioning stand or for controlled dumping by fork truck.

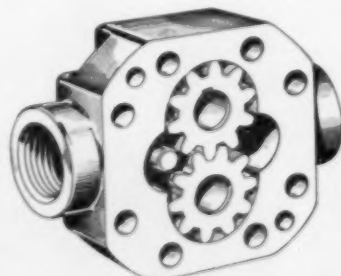
When used on a positioning stand, the legs at the bottom of the box engage the stand and the drop bottom automatically opens. When used for automatic dumping by fork truck, a reinforced box hanger engages the mast of the fork truck. Safety corners prevent box shifting during stacking or when two or more are transported. Corrugated rolled steel legs on the bottom of the box lifting plate are reinforced with steel plate. Boxes also have lapped ends, replacing butt welds. Boxes have four-way entrances and are built from any grade steel to customer dimension and capacity specifications. *Palmer-Shile Co.*

Circle 49 on postcard for more data

### Redesigned Motor

**C**ENTERING a deflector pin in the inlet stream of a new line of hydraulic motors has reduced pocketing effect and increased efficiency. The new motors have one modification to the housing which gives better starting torque than is normally expected in gear motors. At the inlet side material is removed to give clearance between the first tooth and housing permitting pressure to act on the tooth with a maximum moment arm. Sizes range to two hp.

Tooth structure fills mating space forming a seal and eliminating inter-



Detail of Barnes hydraulic motors

mittent surge and vacuum conditions. Deflector pin has a minimum clearance with tooth tip. The motor is available with a speed reducer drive. *John S. Barnes Corp.*

Circle 50 on postcard for more data

## Machinability Test Lathe

METAL cutting research should be spurred by a new machinability test lathe. Providing infinitely variable cutting speeds from 625 to 3775 rpm and higher with special pick-off gears, the lathe is said to have sufficient horsepower and rigidity to carry out practically any desired type of cutting test. The machine also is adaptable to a wide variety of test and research instrumentation. Resistance of a metal to plastic deformation and the amount of energy converted to heat can be measured and normal tool wear computed. The machine is equally adaptable to the study of special tools and tool geometry, for material control purposes, and for research in new alloys, coolants, and other materials.

The test lathe, with a design based on the Mona-Matic series, is supplied with a 20-hp variable speed main drive motor and standard type, mist lubricated headstock. The headstock spindle has a six-in. A-1 Camlock spindle nose for mounting the chuck. A reinforced carriage and apron design provides extra rigidity. Cross feed, cycle control and tool relief are optional where needed. All machine operating controls, including the speed control, coolant pump control, and start, stop, and free spindle controls, are apron mounted. The tailstock is a heavy duty, mist lubricated unit with an anti-friction, air operated center. A special high capacity coolant pump also is standard. The machine is supplied without instrumentation. *Monarch Machine Tool Co.*

Circle 51 on postcard for more data

## Brazing Process

HIGH-TEMPERATURE, high-production copper-brazing has been developed to allow use of low-cost steels and eliminate or reduce machining operations. The atmosphere process produces parts which are said to have excellent resistance to impact and vibration, are pressure-tight, and are free from distortion. Surfaces are clean and bright and require no pickling. Production rates range from a few hundred to several thousand pieces per hour. Low-carbon steels can be joined to high-carbon steels or special alloy steels to ordinary metals. Parts may be heat-treated after brazing.

Safe operating temperatures for parts Superwelded with copper range from minus 100 F to plus 800 F for



Example of Monarch machinability lathe with instrumentation

continuous service, or to 1800 F for short periods of time. Parts can be no larger than 10 by 24 by 36 in. and cross sections should not exceed 1½ by 1½ in. *Superweld Corp.*

Circle 52 on postcard for more data

## Test Stand

MULTIPOWER source stands for the aircraft industry are now in production. A completely packaged unit, it is designed to provide the following types of power: variable voltage dc from five to 32 v with 200 amp maximum; variable voltage 60-c from 0 to 135 v with 20 amp maximum; variable voltage from 95 to 135 v with variable frequency from 380 to 420 c. Optional caster mounting provides mobility. *Industrial Engineering Corp.*

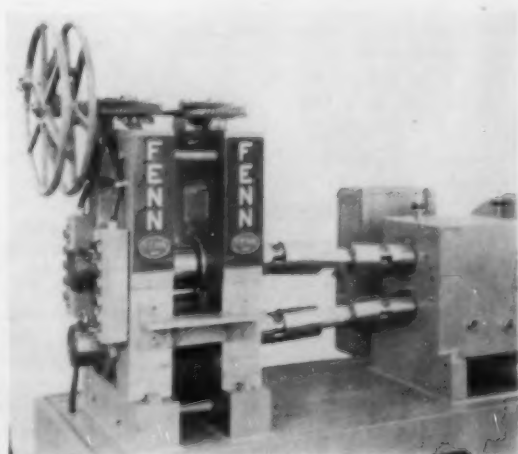
Circle 53 on postcard for more data

## Laboratory Mill

DRIVE of a new combination rolling mill permits two-high operation, four-high operation with back-up rolls driven, and four-high operation with work rolls driven. To shift from back-up roll drive to work roll drive, the drive couplings can be changed in a few minutes time. To shift from four-high to two-high operation, the work rolls and their bearings are removed. As a two-high mill, breakdown passes can be taken. As four-high with back-up rolls driven, intermediate passes can be taken on stock of substantial width. As four-high with work rolls driven, light passes on all work and substantial passes on narrow work can be taken. *Fenn Manufacturing Co.*

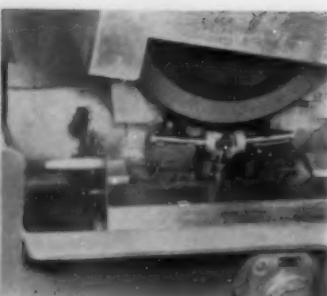
Circle 54 on postcard for more data

Combination laboratory rolling mill set for back-up roll drive





Operating Planet slotting machine, and closeup of fixture. Fixture turret has double acting locators with carbide inserts.



### Slot Grinder for Two Parts

Now in production is a machine for rough and finish grinding of various slots in soft or hard parts. One example is used to rough grind nominally 0.125-in. slots in vane type compressor rotors and then finish grind to 0.138-0.140 in. after heat treating to 55-58 Rockwell C. Material in the rotors is 8655 steel. Finish slots are ground to a production surface finish of five microinches or less and total variations in flatness and parallelism between the opposing faces of the slots are held to less than 0.0003 in.

Some of the features of the machine include automatic diameter compensation as wheel is dressed. Spindle axis is automatically lowered so that periphery of wheel is maintained at

proper depth in slots. A two-speed motor is employed so that a high surface speed can be used for roughing and medium speed for finishing. Nominal cut speeds are respectively 12,000 and 6000 fpm.

When set for roughing the wheel runs at high cut speed and also oscillates in a vertical direction to alternately plunge and relieve the grinding wheel. When set for finishing the cut speed is reduced and the wheel feeds steadily. An air-oil feed system regulates the rate of down feed on the wheel. Coolant guarding is arranged so that grinding is done under water. Coarse rubber bond cutoff type wheels are used. Planet Products Corp.

Circle 35 on postcard for more data

### Race Marker

A MARKING machine is designed to roll identification on peripheries of bearing races at the rate of 1500 to 2500 per hour. Parts are fed to the chute from a turret lathe and are picked up and placed upon an arbor. The arbor recedes, dropping the piece into discharge chute.

The cycle is timed by a Geneva motion actuated by a hydraulic system. Geo. T. Schmidt, Inc.

Circle 36 on postcard for more data

### 'Scope Amplifier

Wide band driver amplifier-power supply, model 150-300/700, accommodates any of 11 available interchangeable, plug-in 150 Series preamplifiers. Designed for rack-mounting in the user's laboratory or research equipment, the new amplifier is intended to drive a low power galvanometer element, panel meter and/or oscilloscope, individually or

simultaneously. Frequency range is dc to 10,000 cps, or the limits of the particular "150" preamplifier used with it. Sanborn Co., Industrial Div.

Circle 37 on postcard for more data

### Resin

LAMINATING resin L-904 and Gelcoat L-914 have been released from the development stage and are now available. L-904 is a thermosetting modified epoxy resin, reported to have excellent dimensional stability, brilliant white in color, with good liquid life properties.

L-914 is a brilliant white colored Gelcoat material that is said to provide excellent hanging properties, and harden with high gloss on a laminated surface at ambient room temperature. It is well suited for achieving continuity of surface properties. This material is a thermosetting modified epoxy resin with excellent dimensional stability. Rezolin, Inc.

Circle 38 on postcard for more data

### Adjustable Drive

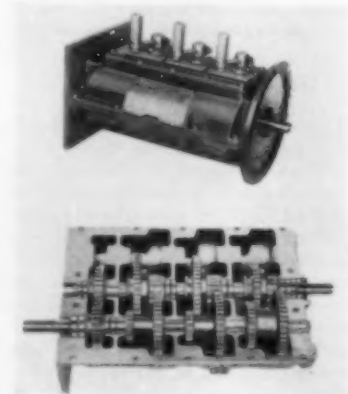
Vs-100 Drive is a wide-range adjustable-speed drive for machine tool feeds. The drive affords a speed range of 100:1 with continuous electrical speed adjustment with a high degree of stability. Capacity is from ½ to 4 hp.

The units are complete packaged drives with electronic control panels that are suitable for mounting and integrating with other machine controls. Drive motors are specifically designed for operation from the electronic control units. Sealpak construction is a feature of the control panels, whereby all of the small electronic components are grouped, wired, and sealed in plastic for complete protection. Operation of the drive requires standard single-phase power. The drive can be modified to provide extremely close speed regulation by tachometer feedback through addition of an amplifying section on a building-block basis. Reliance Electric & Engineering Co.

Circle 39 on postcard for more data

### Transmission

A SIX-SPEED transmission provides changes in geometric progression. Model No. 16400 gives ratios of 1, 2.50, 6.25, 15.60, 39.0 and 97.5 to 1. Torque capacity of this transmission is 480 lb-in. All gear shafts are of alloy steel, heat treated and shaved. All revolving shafts operate on anti-



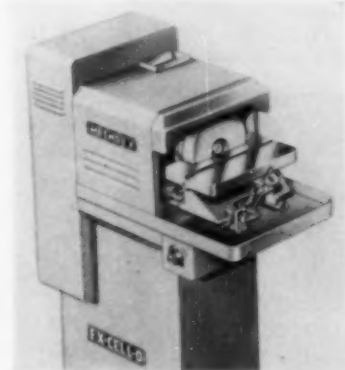
Machine tool transmission

friction bearings. Shifts are obtained through three shift levers. Case is drilled for pancake type motor mounting also. Western Manufacturing Co.

Circle 60 on postcard for more data

## Sharpens Carbides

**S**HARPENING carbide tools by Method X electrosark machining instead of abrasive wheels is currently available in a tool sharpener, Style 43, recently introduced. It is designed primarily for off-hand sharpening of single-point solid carbide and carbide-tipped tools. For a wheel, the machine uses a ten-in. cast-iron disk, connected to serve as the negative terminal of an electric circuit. A semi-solid dielectric film applied to the disk provides a spark gap of proper distance. As the tool is oscillated across the wheel face, current pulsations are released as spark discharges. The high current densities of the single-pulse discharge overcome the tensile strength of the material and a minute particle is removed from the tool at this point. The resulting crater depth and diameter are proportionate to the energy discharged per pulse. Thus



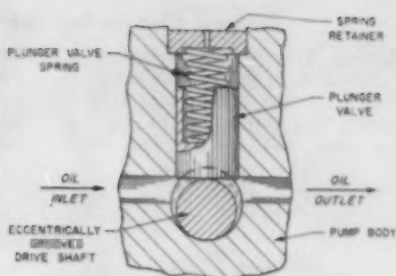
Electrosark sharpener is built to JIC standards

rough or finish cuts with resulting surface can be obtained by simply setting a power selector switch. Method X does not cause parallel or unidirectional tool marks, heat checks or grinding cracks, according to the company, Ex-Cell-O Corp.

Circle 61 on postcard for more data

## Dust Control

**A**DUST control unit demonstrated efficiency up to 99 per cent in test situations with dust loadings at five grains per cu ft and 70 per cent of the material below five-micron particle size. Type A Hydro Precipitator Scrubber collects dust by hydro-compressing exhaust gases through a system of multiple tubes into a water chamber. The violent water



Bijur rotary pump lubricator, showing drive shaft (left), filler plug outlet valve (right), and oil level gage, and cross sectional drawing of pressure mechanism. Plunger valve above shaft maintains constant pressure on shaft by spring mechanism. Oil passes shaft into distribution system only when groove is in down position.

## Pump Lubricator for Precision Machines

**C**ONTINUOUS oil film of constant thickness is maintained on critical bearing surfaces with an automatic lubricator. Use of a constant-pressure rotary pump eliminates two major problems: the rise and fall of tableways and other precision bearings due to periodic hand oiling or cyclic lubrication; and the constant dripping of oil that often occurs with high volume flood lubrication systems.

A pressure of 20 psi is maintained by the lubricator throughout the distribution system and at the lubrication points. The pump, containing a plunger valve riding in an eccentric groove, is mounted in a die-cast one-pint capacity reservoir. The complete unit includes an inlet filter and a reservoir level gage. The lubricator shaft, operated at 1800 rpm, is driven either from a shaft on the machine or by a direct connected 1/20-hp motor.

The 5/16-in. diam pump shaft contains an eccentric groove, 0.05 in. at

its deepest point, in which a spring-loaded plunger valve rides. This plunger valve serves both as a seal between the inlet and outlet ports and as a relief or unloading valve to maintain constant pressure. As the shaft rotates, oil is drawn in through the filter to the "sweep area" of the eccentric groove, carried around to the opposite side, and then discharged into the outlet line.

The volume of oil delivered by the lubricator is dependent upon the pressure maintained in the system. Any oil that escapes from a bearing is instantly replaced by fresh oil. Distribution is through standard tubing, fittings and Meter-Units. The new lubricator has a feed rate ranging from 0 to 27 cc of oil per minute, depending on rotation speed of the shaft, number of lubrication points on the machine, and the fit of the bearings. Bijur Lubricating Corp.

Circle 62 on postcard for more data

agitation set up causes secondary pressure turbulence and additional scrubbing action in the tube chamber. The scrubber comes in 15 sizes for capacities ranging between 500 and 40,000 cfm. Sludge can be removed constantly or intermittently by manual, hydraulic or mechanical means. Johnson-March Corp.

Circle 63 on postcard for more data

## Press Unloader

**A**N automatic unloader for the No. 16 quenching press now available attaches to the left front corner of the press. It is controlled by built-in switches and valves. As the press carriage advances to unloading posi-

tion, the unloader arm rotates into position over the quenched part. The unloader head lowers, and adjustable jaws close on the quenched part. Holding the quenched part, the unloader head raises and rotates through 180 deg. The jaws open, releasing the quenched part into a tote basket or a conveyor.

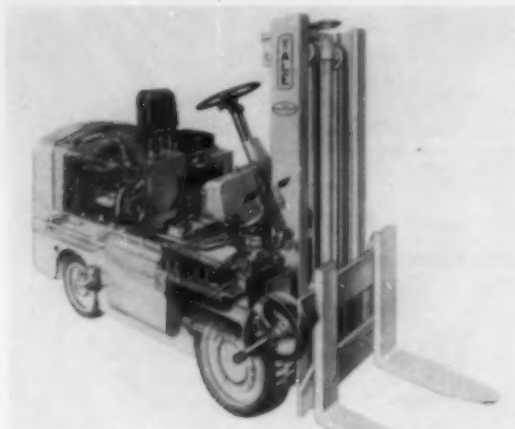
The No. 16 quenching press accommodates round, flat, or irregularly-shaped parts up to 15 in. in the largest dimension. The press provides quenching under close automatic control at all stages of the quenching cycle. Parts are held between accurate dies during the quenching cycle. Gleason Works.

Circle 64 on postcard for more data

## Torque Converter for Fork Truck Line

FULLY automatic gear shifting is provided in the KGA51 series of fork lift trucks in the range of 3000 to 8000 lb capacity. With its first new line since 1954, the firm now offers

assembly. Clutch disks can be replaced without removing major components since they are easily accessible by the removal of the transmission housing cover.



Yale torque converter fork lift offers lowered cowl and seat for vision and driver comfort.

trucks with conventional clutch, fluid coupling and torque transmission drive with choice of gasoline, LPG or Diesel power. A large oil reservoir, helps prevent overheating, as does running oil lines through an auxiliary radiator and applying fins to the lines. Clutches are oil cooled, oversize, duplex type, hydraulically operated. All transmission gears are in constant mesh with wide face helical gears being used. Oil pressure is provided by an externally mounted pump.

The whole transmission unit can be removed from the truck without dis-

For inching control, a slight depression of the brake pedal reduces the pressure on the clutch causing a partial separation of the plates. As the inching control is in the same circuit as the brakes, further depression of the pedal applies the hydraulic brakes. Dual brake pedals have been provided so that the operator may operate the inching control with his left foot while the right depresses the accelerator to provide faster lift or attachment action. Yale & Towne Manufacturing Co.

Circle 65 on postcard for more data

## Salvage Plating

A SELF-CONTAINED unit for precision hard chromium plating of parts, tools, gages, etc., as well as for salvaging worn or undersized parts has been developed. Utilizing the Morey process this equipment can deposit under close control. Its throwing power makes it possible to deposit plate in grooves, recesses, shoulders, threads, etc. According to the manufacturer the resulting plate is extremely dense and close grained, will not chip or flake, and is guaranteed against peeling or chipping. Since plating thickness can be held to extremely close tolerances, dimensions of plated parts can be readily held to within 0.0001 in., without requiring grinding or lapping after plating. Success of the process lies in the close

control of time, current density, and solution temperature. In addition, it employs a special catalyst that contributes to throwing power. Chrome Electro-Forming Co.

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## Shipping Paper

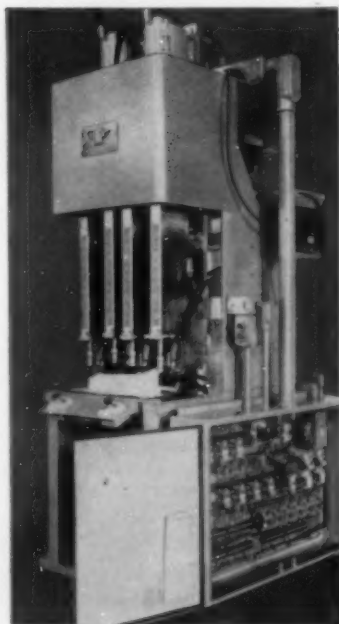
ABRASION damage to tractors during transit is reduced with a fitted cover strapped around vital engine areas. Paper used consists of two sheets of kraft, laminated for a high degree of water-proofness and reinforced with glass fibres. One side of the sheet is specially treated to eliminate friction and consequent abrasion damage. The paper is called Mar-Pruf Trac-Pak and is manufactured by Cromwell Paper Co.

Circle 67 on postcard for more data

## Stud Driver

UNIVERSAL stud driving machines have been developed to drive a number of studs simultaneously at various angles up to 30 deg from vertical and at various heights up to 12 in. above the table. There are two models, one which drives one to six studs, and one which drives up to 12 studs simultaneously. Production rate, from and to conveyor, is four to six seconds. All heads can be changed to a new pattern in less than an hour. A vibrator hopper feed sorts and delivers the studs to the positioning fingers, ready to drive. To compensate for distortion in die-cast components being produced, the components are clamped in place in an epoxy resin mold by from one to six self-locking hydraulic clamps. Each head is driven by a separate motor with its own interlocking control circuit and can be made inoperative by a simple disconnect of hydraulic and electric circuits.

The machine is operated by two pommel buttons which must be de-



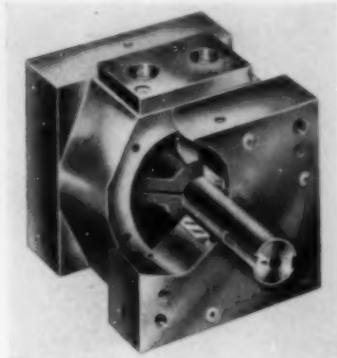
Flexible stud driving machine by Syracuse

pressed simultaneously and conforms to JIC electrical standards. If any motor should become overloaded, the entire machine shuts down and the panel shows which circuit is overloaded. Syracuse Special Machine Co.

Circle 68 on postcard for more data

## Torque Motor

**A**N instant oscillating torque motor is said to be capable of up to 280 deg rotation or oscillation, of a shaft. The unit is applicable to turning, opening, closing, clamping, indexing, feeding, locking, pushing, mixing, or moving any type load or mechanism. It is reported to operate with equal efficiency on air, oil, water, or fire-resistant fluid pressure mediums. The



Oscillating torque motor for machine and materials handling applications

square shaped unit incorporates heavy steel heads, manifold piping and large self-lubricating bronze bearings. Tests are said to indicate that this motor is completely leak-free and that it offers the lowest possible break-away torque for air use. There are 14 models which may be mounted on any of the six faces. Four shaft models also are offered. Fittings meet JIC specifications.

With proper controls, the rotative speeds are limited only by the fluid pressure volume. Torque of this device can be doubled while maintaining the same exterior dimensions by simply limiting the arc to 100 deg. Outputs range from 2250 to 1,800,000 lb-in. at 1500 psi, with respectively eight and 1740 cu in. displacement. *Roto-Motion Motors, Inc.*

Circle 69 on postcard for more data

## Spark Protractor

**T**YPE 2 electronic spark protractor shows on the large General Electric DB-18 meter a continuous indication of spark advance. Accuracy is reported as  $\pm \frac{1}{2}$  crankshaft degree at all speeds. A new pentode circuit is designed to give stable operation at low idle rpm. Pulses from two pickups on the engine control the conducting period of one-half of a

multivibrator circuit. Ratio of the conducting to non-conducting period is calibrated in degrees spark advance on the meter. The device is available for two or four cycle, six or eight-cylinder engines as standard, and one, four or 12 cylinder optional. *Performance Measurements Co.*

Circle 70 on postcard for more data

## Check Valve

**A** GASKET-mounted pilot-operated check valve for use with  $\frac{1}{2}$ -in. piping in industrial oil-hydraulic systems is now available. Model 4CG-03 is of spring-closed poppet type construction, to provide uniformly consistent operation regardless of valve mounting position. These valves can be arranged in control systems to block flow in a given direction until opened by remotely applied pilot pressure and to allow free reverse flow. Rated capacity is eight gpm, for use in systems with operating pressures up to 2000 psi. The valves require pilot pressure greater than 40 per cent of system pressure to open. The new units are available with either 30, 75 or 150 psi cracking pressure. Mounting subplates are also available. *Vickers, Inc.*

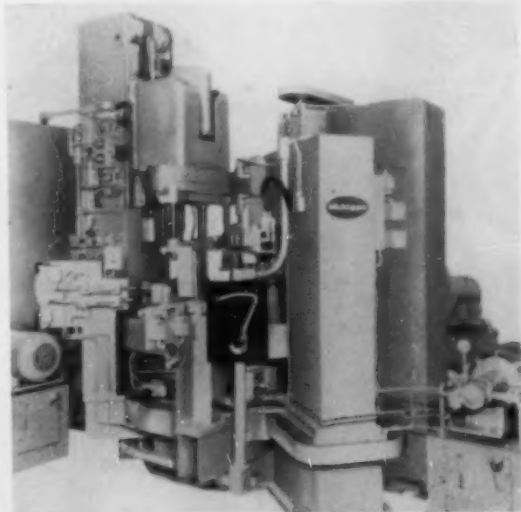
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## Dial Machine Tests Workpiece

**B**RAKE pedals are physically tested as well as machined in a horizontal-vertical dial type machine. It drills, spotfaces, chamfers, finish reams, taps and tests 120 parts per hour. Standard components are as-

sembled around a 42-in. automatic indexing table. The test detects fractured pedals, eliminating them from the assembly line. *Michigan Drill Head Co.*

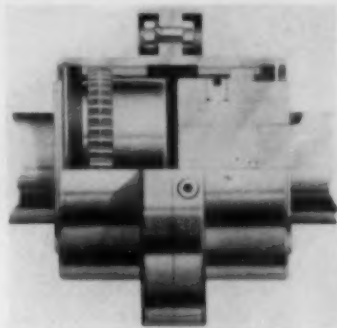
Circle 72 on postcard for more data



Machine for drilling and hydraulically proof-testing brake pedals.

## Couplings

**S**ERIES 3D dihedral self-aligning couplings are designed to handle misalignment up to three deg between driving and driven shafts of direct connected machines. Included in the



Ajax couplings

features is tooth design which makes it possible to have close tooth clearance. The load is normally carried at the center of the tooth, and under maximum rated misalignment the driving force is carried across an entire half tooth. Lubricant is sealed in. *Ajax Flexible Coupling Co.*

Circle 73 on postcard for more data

## Vanadium Alloy Steels and Their Uses

Though the beneficial effects of vanadium in alloy steels have been known for many years, the ore was at one time a comparative rarity. Vanadium is still rather expensive because of the care required in processing the ore; however, there are now ample supplies for present-day applications.

Vanadium is a highly valuable alloying agent. It is an extremely powerful deoxidizer, though seldom used primarily for that purpose. Vanadium also tends to form stable carbides in steel—carbides that do not go readily into solution when heated above the critical temperature for quenching. The grain-growth-inhibiting effect of vanadium promotes a fine-grained structure over a fairly broad quenching range, thus imparting strength and toughness to the heat-treated steel. Moreover, the carbides are not prone to agglomerate during the tempering operation.

Vanadium is used in constructional steels, not only to refine the grain, but to improve the mechanical-property balance. Generally speaking, the amount of vanadium in constructional steels ranges from approximately 0.03 to 0.25 pct, though larger quantities are required in tool steels and special analyses.

A list of products containing vanadium would include certain types of spring steels, plates, gears, high-temperature steels; forged axles, shafts, and turbine rotors; and other items requiring impact- and fatigue-resistance.

You are invited to consult with our staff whenever you need information about vanadium steels. Bethlehem metallurgists will gladly advise you regarding analyses, heat-treating, machining, and anticipated results. Please remember that the services of these technicians are yours for the asking, and that no obligation is implied.

And may we point out, too, that Bethlehem makes all AISI standard alloy steels, as well as special-analysis steels and the full range of carbon grades. Call upon us for your alloy steel requirements; now and always, we will endeavor to meet your needs promptly.

*If you would like to have a reprint of this advertisement, or of the entire series from I through XII, please write to us, addressing your request to Publications Dept., Bethlehem Steel Company, Bethlehem, Pa.*

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## FREE LITERATURE

### Grinding, Lapping 1

Just published is a 32-page general catalog of precision grinding and lapping machines—cylindrical grinders, cam, shape and crankpin grinders, tool and cutter grinders, universal grinders, surface grinders, lapping machines and special purpose grinders. *Norton Co.*

### Mica Insulation 2

Physical properties of bonded mica insulation in a variety of shapes and compositions are tabulated and explained in 12-page catalog M-55. *Continental Diamond Fibre Div., Budd Co.*

### Chipless Cutting 3

Roto-Flo "chipless machining" machines for cold-forming of toothed parts are covered in bulletin RF-55. *Michigan Tool Co.*

### Largest Plater 4

Details of the world's largest bumper plating facility are given in a four-page folder, offered by *George L. Nankervis Co.*

### Process Gaging 5

Sigmatic systems for in-process and final inspection of several dimensions are explained and applications illustrated and described for some 20 workpieces in circular 592. *Pratt & Whitney Co.*

### Ductile Iron 6

Ductile Ni-Resist (Nickel Austenitic Ductile Irons) gives four pages and seven tables. The material combines the strength and ductility of ductile cast iron with the resistance to corrosion, heat, and metal-to-metal wear possessed by conventional Ni-Resist castings. This paper compares properties of conventional and ductile Ni-Resist irons and summarizes present and potential industrial applications. *International Nickel Co.*

### Neoprene 7

Neoprene Notebook No. 65 covers weathering and sunlight resistance, describes the affects of sun, atmosphere and climate on rubber, tells how exposure tests are run and interpreted by rubber technologists. *Elastomers Div., Du Pont.*

### Gear Deburrer 8

The BMI-15 Burr-Master for production deburring and chamfering of internal gears and spline from 2 to 20-in. nitch diam is described in bulletin No. 103-103 available from *Modern Industrial Engineering Co.*

### Presses 9

Illustrated bulletin 65C, 26 pages, presents a modernized line of gap frame double crank presses consisting of the upright series B and open back inclinable series BI. *Niagara Machine & Tool Works.*

(Please turn page)

12/1/55

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**A-C Control****10**

Dynamic electronic controls bulletin EC-1 contains non-technical, simplified information on the installation, performance and maintenance of the basic control to accomplish stepless speed control of eddy-current rotating equipment, using an a-c line as the power source. *Eaton Manufacturing Co.*

**Aero Testing****11**

Details of airborne recording using DataTape systems are the subject of a feature article in *CEC Recordings*, Vol. 9, No. 4. *Consolidated Engineering Corp.*

**Engine Controls****12**

Latest catalog of a line of automatic controls for vehicle and stationary engines is now ready. Catalog No. 5. *Synchro-Start Products, Inc.*

**Light Trucks****13**

Aluminum industrial trucks featuring lightness, torsionally flexible bed construction and exclusive casters are described in a folder just published by *Magnesium Co. of America, Tobeu Aluminum Div.*

**Hydraulics****14**

Oil-hydraulic pumps, controls and accessories for general industrial application are covered in a new catalog which includes engineering, design and application information relating to pumps, pressure controls, volume controls, directional controls, control assemblies, hydraulic motors, transmissions, cylinders and hydraulic accessories. *Vickers, Inc.*

**Heat Treat****15**

New issue of house organ features two articles on automation for modern heat treating, controlled atmosphere processes and new automatic dewpoint control systems. "Heat Treat Review," Vol. 6, No. 2. *Surface Combustion Corp.*

**Automation****16**

Twenty new automated transfer-type, line-index, trunnion-type and rotary-index special machine tools; all performing a variety of metal-working operations, including balance milling and automatic inspection and rejection, air testing, assembly and marking, are illustrated in a 24-page catalog. *Snyder Tool & Engineering Co.*

**Invest Casting****17**

Outlining in pictures and text the steps involved in investment casting and the wide range of intricate parts that may be mass produced by the method, a booklet is being made available from *Microcast Div., Austenal Laboratories*.

**Handles Roof Panels****18**

A new transfer machine which moves large sheet metal panels between presses automatically is illustrated schematically and on fender skirt and roof press lines. Four-page folder. *Sahlin Engineering Co.*

**Making 3-D Cams****19**

Steps in defining and making three-dimensional cams are portrayed in a folder offered by *Parker Stamp Works, Inc.*

**Pyrometer Helps****20**

Bulletin F 7259 gives service tips for pyrometer users. *Barber-Colman Co., Wheelco Instruments Div.*

**Gear Grinders****21**

Fully automatic gear grinding machines have such features as automatic down feed, trimming, loading, rejection and release of workpiece. Eight-page folder. *Gear Grinding Machine Co.*

**Welding Research**

Technical data and information on the newest electric resistance welding research and application to problems of industrial fabrication will be sent free of charge to individuals or concerns requesting them on professional letterheads by *Technical Editor, Sciaky Research Center, 2511 Purdue Ave., Los Angeles 64, Calif.*

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# NEW

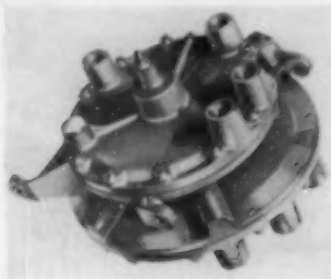
# PRODUCTS

## AUTOMOTIVE - AVIATION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

### Balances Fuel

A hydro-mechanical fuel balance system now in production is claimed to hold aircraft center of gravity within one per cent of mean aero-



dynamic center. It accomplishes this through accurate automatic sequencing of fuel tanks widely dispersed from the center of gravity. A control unit senses absolute fuel head in forward and aft tanks and feeds these heads into opposing diaphragm chambers at opposite ends of a control valve. This valve in turn operates a shut-off valve between the tanks.

Desired fuel head difference is held to plus or minus  $\frac{1}{2}$  in. over the complete range of flows, temperatures and flight attitudes up to 20 deg climb or dive. Any error is constantly compensated for throughout the entire range of fuel consumption. *Parker Aircraft Co.*

Circle 25 on postcard for more data

### Silicone Lubes

Versilube F-50 and Versilube G-300 silicon lubricants for jet aircraft and industry now are being made available in commercial quantities. The operating temperature range of the new lubricants is from -100 to over 400 F. The fluid flows at -100 F. and bearings containing the grease turn readily at that temperature. Both the fluid and grease are said to show much smaller change in viscosity or consistency over this wide temperature range than do any other lu-

bricants. Versilube F-50 obtains its properties without the use of additives. For example, it has lubricity without "oiliness" additives, low pour point without pour-point depressants, excellent temperature-viscosity properties without V.I. improvers, and inherent high temperature stability without oxidation inhibitors. *Silicone Products Dept., General Electric Co.*

Circle 26 on postcard for more data

### Truck Wiper Blade

Windshield wiper developments previously found only on passenger cars are now being made available to truck and fleet operators. Heavy duty blades are available in two models, one for use on flat windshields and one for curved windshields. The new blades are more rugged than previous types and have been especially designed to work under the greater arm pressure requirements of commercial vehicle operation. *Trico Products Corp.*

Circle 27 on postcard for more data

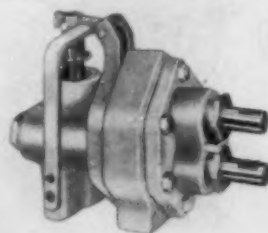
### PM Motor

Permanent magnet motors  $1\frac{1}{4}$  in. in diameter designed for minimum radio noise, now are available. Type AM-215 is a typical example. It is designed to meet MIL-M-8609 specification. The motor alone weighs only five oz and measures 1.25 in. OD x 2.14 in. long. Radio noise is minimized by shielded leads. Specially designed metal brush holders avoid sticking in environmental tests and do not protrude into outside housing. Temperature range is from -55 C to +71 C. Motor speeds range from 6000 to 20,000 rpm. Speeds are controllable to  $\pm$  one percent over voltage range from 24v to 29v by using a governor. The motor is available with gear train, governor, brake or any combination thereof. When used with gear train, gear ratios range from 6:1 to 4000:1. *John Oster Mfg. Co.*

Circle 28 on postcard for more data

### Valve and Pump

A new spool type three-way valve and pump is designed for use with single acting cylinders on truck mounted applications and material



handling equipment. It can be operated by cable or lever control for raise, hold and lower positions.

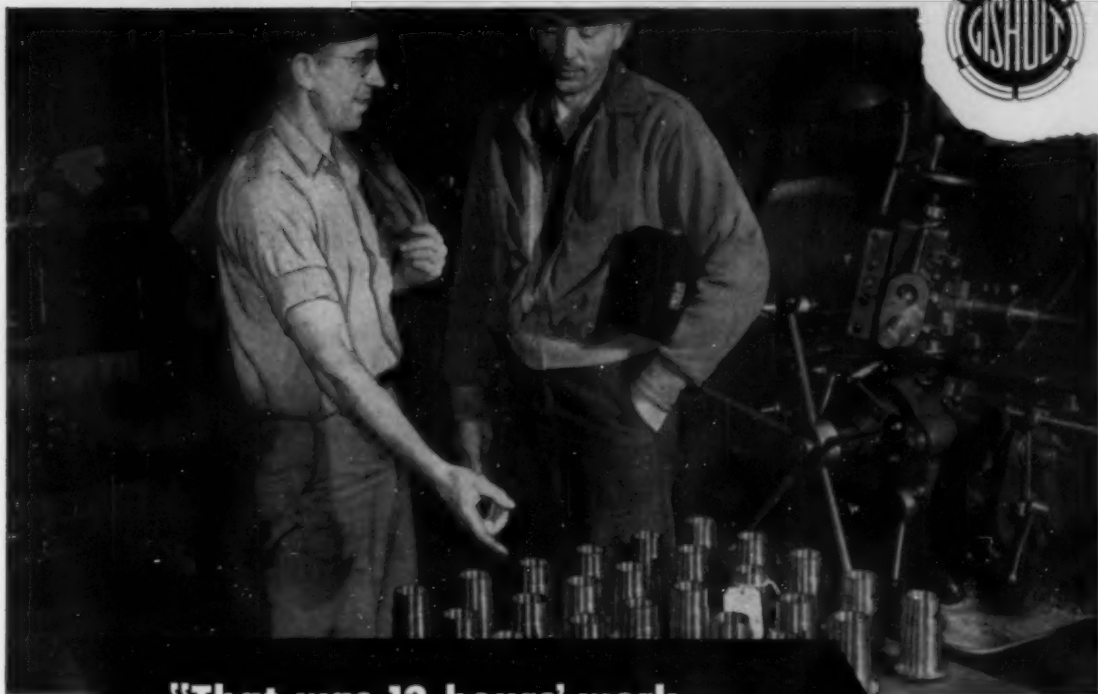
The SL series is rated for 1000 psi duty and tested at 2000 psi overload and 3000 psi shock load. It has a built-in, adjustable pressure relief valve. The series is available in five sizes, developing from eight to 22 gpm at 1000 rpm-1000 psi. Single or double shaft models fit any rotation of power takeoff. Frictionless shaft sealed models are available for continuous operation. *Wisconsin Hydraulics, Inc.*

Circle 29 on postcard for more data

### Plastic Clamps

Reinforced plastic cable clamps being marketed are non-corrosive, extra strong, fire resistant, provide excellent insulation, and are said to be ideal for applications where vibration and shock are important factors. Used originally in the aircraft industry, they are available now to other industries. There is said to be less danger of short circuit and fire, abrasion-resistance, and ease of installation. Glass fibers and thermosetting resins used in their manufacture do not melt at high temperatures. *Lynn Laminates, Inc.*

Circle 30 on postcard for more data  
(Turn to page 102, please)



**"That was 12 hours' work . . .  
NOW WE DO IT IN 8!"**

Yes, the operators who've struggled along with older turret lathes will tell you: A 50% increase in production is not unusual when you replace with new Gisholt Ram Type machines.

Many of the old manually operated functions have now become automatic. They're so much simpler and easier to run that you can't help but get more efficiency. Selective automatic speed changing gives instant changes between high and low spindle speeds. There's hydraulic clutching and braking—no effort.

Automatic indexing and clamping of the hexagon turret saves more time. These are a few of the modern features that give you the smooth production rhythm that insures higher overall efficiency.

Add to these the power and rigidity to take multiple cuts and you have the unbeatable combination that means bigger production and lower costs. It's the performance that will "buy off" your older machines. Replace with modern Gisholt Turret Lathes.

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# Observations

By Joseph Geschelin

## Belt Drive

For a long time we have had silent gear drive and chain drives for the timing system of an engine. Now we hear of work under way in the development of a special belt drive, using a "silent" type of sheave. It will be of interest to learn how this new approach works out.

## Truck Drive

Many developments are under way from many directions in providing an automatic transmission for motor trucks. Practically everyone in the gear business is working on this one. And it may not be long before practical and efficient automatic drives become as commonplace in trucks as they are in passenger cars.

## Central System

Although nothing has been said openly for some time, it is our feeling that a number of well known parts makers have been engaged in the development of something that may be termed a central source of hydraulic power for passenger cars. Power assist is being used for so many functions today that it makes sense to organize the source of power in a small package. There are knotty problems, of course. One of these is control of the wide range of pressures that may be required. But the experts will come up with an answer for this, too.

## Engine Control

The requirements for a good engine governor for motor trucks are the same today as they were many years ago. Most important is close regulation. Poor regulation causes the throttle to close too early, results in robbing the power of the engine. Simple installation, adequate provi-

sions for sealing, and trouble-free operation are other criteria. If these requirements are satisfied, there remains the question of cost. Cost must be reasonable if the governor is to be attractive to the large fleet buyer.

## Cast Cranks

Early in '56 one of the well known passenger car V-8 engines will be using shell molded cast crankshafts exclusively. As a matter of fact, a goodly percentage of 1955 engines were equipped with cast crankshafts without fanfare in preparation for the shift.

## Hidden Arc

Lincoln Electric automatic welding heads, featuring the "hidden arc" technique have emerged in large measure in the new rear axle plant placed in operation by Buick recently. Lincolnweld heads are found on a variety of welders on the rear axle housing, on welders for the torque tube assembly, and on other heavy duty parts.

## Electrical Noises

Comment on current research projects dealing with the problems of radio interference and contamination of dielectrics is found in the September issue of the Stanford Research Institute News Bulletin. Radio interference, particularly in aircraft, comes from a variety of sources—sparking, thermal effects, precipitation static produced in antennas mounted under plastic surfaces, particle effect. The study of these phenomena is a continuing project at SRI. Latest problem arises from unexplained performance break-downs in printed circuits now being used so widely. These have occurred in television sets, telephone switching mechanism, high speed computers, radar. Attention is being given to the contamination of dielectrics by a team of analytical chemists.

## Tinted Glass

Motor car producers, who have installed over 6.5 million tinted glass windshields in recent years, are still plagued by experts in the fields of optics and optometry who claim, on the basis of theoretical analysis, that such windshields constitute a driving hazard. AMA has presented for the record the results of careful experiments under actual night driving conditions, originally by Roper and more recently by Doane and Rassweiler, proving that under the most severe extremes of low level illumination and minimum contrast, the threshold seeing distance does not create a hazardous situation. What makes the problem so irksome is that while the experts in the first instance have shifted their ground, others continue to appear on the scene with the same premise to muddy the waters afresh. We should like to close this with the reminder that in scientific work it is axiomatic that when a theory fails to fit the facts, it is always wise to revise it.

## Disk Brake

Evidently there is considerable activity in the development of a simple, low cost disk brake system for motor cars. We learned just recently that one of the clutch manufacturers is giving this matter a lot of thought and it seems quite natural for them to enter the picture. Too it appears that one of the large car producers is doing a lot of research on the same subject. Disk brakes may well develop into a major competitive race.

## Oil Cooling

Doubtless you have noted that the new Hydra-Matic drive will have an oil cooler, among other things because of the introduction of the additional fluid coupling. We have also learned that another large producer will be adopting an oil cooler for a drive that has featured air cooling up to now.

"Let's be sure to specify

# STEERING LINKAGE BY THOMPSON"



**M**ORE and more automotive manufacturers today specify "Steering Linkage by Thompson" when designing and planning their cars, trucks, buses and tractors of tomorrow.

And for good reason—for they've learned that "You Can Count on Thompson" as a dependable source of supply. And they've learned, too, to count on Thompson for important developments in ball joint design, for steering linkage, as well as other applications. Thompson's steering linkage units are in yesterday's cars and today's cars. And they'll be in tomorrow's cars, too.

Typical of these developments is the revolutionary Thompson-engineered front suspension ball joints, the greatest advance in automotive front suspension in 20 years. For over 50 years Thompson has played an important role in the automotive world. If you use steering linkage assem-

blies, specify "Steering Linkage by Thompson". For details on how Thompson's skilled steering engineers can help you with your steering linkage developments, write, wire or phone Thompson Products, Inc., Michigan Div., 7881 Conant Ave., Detroit 11, Michigan, WA 1-5010.

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## Thompson Products

**MICHIGAN DIVISION**  
DETROIT • FRUITPORT • PORTLAND

# Latest Designs and Production Techniques Subjects at ASBE Convention

By Paul C. Kennedy

**N**EARLY every interest of its audience was served at sessions of the 10th Annual Technical Convention of the American Society of Body Engineers in Detroit. Body design and testing, new materials for the product and for production, sports cars and basic products planning were investigated. As usual, the exhibitors in the Rackham Bldg. lower auditorium provided colorful displays of the latest in glass engineering, windshield wipers, fastening devices, upholstery, chemicals, drafting equipment and engineering services.

Salient design features of the Continental Mark II were revealed by J. W. Richards of the Continental Div., Ford Motor Co. Design and production features of this car will be presented in some detail in an early issue of **AUTOMOTIVE INDUSTRIES**.

The inventor of the Packard torsion bar suspension system, W. E. Allison, in pointing out its features, suggested that the system can be used with solid axles front and rear, independent, solid or deDion rear axles, and for multiple axle vehicles. He also anticipates changes in seat cushions as the result of suspensions with a flat level ride, using a foam rubber pad or air cushion or even elastic bands. A short motion picture depicted Allison's light weight (600 lb) demonstration car which made the rounds in Detroit in 1951.

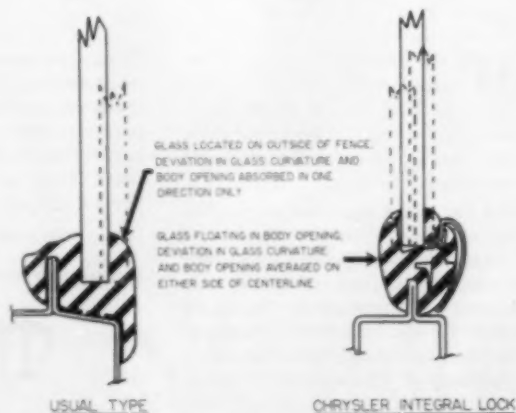
Air conditioning for the 1956 Rambler was discussed by S. O. Wahamaki of American Motors Corp. This system will be described in an early issue of **AUTOMOTIVE INDUSTRIES**.

Standards for plastics used in metal forming were discussed by L. F. Bogart, representing Marblette Corp. He reported that the American Society of Tool Engineers and the Society of Plastics Industries, using grants from various firms, are establishing test procedures and standards; and he suggested that the SBME participate in this program. For the application of plastics to draw and forming dies, he said, the best materials are able to form up to 0.09 in. and draw 0.06 cold rolled steel for a few pieces to prove die design. Dies which can be easily altered to test new shapes are being made from abrasive-resistant resin cast over a plastic or metal core. For heavy gage work a core resin with high compressive strength is now under test, for short runs on 0.03 to 0.04 in. steel.

An overall picture of vinyl upholstery and trim,  
(Turn to page 111, please)

## EXHIBITORS

The Randall Co.  
Presstite Engineering Co.  
Upholstery Leather Group, Inc.  
Burlington Mills, Inc.  
Libbey-Owens Ford Glass Co.  
Stubnitz Greene Spring Corp.  
Soss Manufacturing Co.  
Tinnerman Products, Inc.  
Engineering Reproduction, Inc.  
Douglas & Lomason Co.  
Kish Industries, Inc.  
Dewey & Almy Chemical Co.  
Palnut Co.  
United Carr Fastener Corp.  
Robin Products Co.  
Trico Products Corp.  
Pittsburgh Plate Glass Co.  
Shakeproof, Div. of Illinois Tool Wks.  
Owens-Corning Fiberglas Co.  
Graham Manufacturing Co.  
American Forging & Socket Co.  
Textileather, Div. of General Tire & Rubber Co.  
Keuffel & Esser Co.  
Automotive Rubber Co., Inc.  
Atwood Vacuum Machine Co.  
Creative Industries of Detroit  
Fiber Bond Corp.  
Capitol Engineering Reproduction Co.  
United States Rubber Co.  
The Anderson Co.



Floating-glass weatherstrip developed by Chrysler Corp.

**STUDEBAKER** ...like many

other leading engine manufacturers

selects and distributes...for

authorized replacement service...



**Perfect Circle**

2 in 1 chrome piston rings...the

standard of comparison!



# METALS

*Price Advance for Steel May Be on Way. More Nickel Will Be Available Through Release of Metal by the Government*

By William F. Boericke

## Steel Mills Look for Capacity Business Into 1956

Steel mills continue to operate at capacity without making any headway in cutting down the steadily increasing backlog of orders. New business exceeds output, as it has for several months, without any indication whatever of slackening. Capacity operations appear assured for the first quarter of 1956, quite probably for the first half.

The "fantastic demand for steel"—to quote the *Iron Age*—has the producers gravely concerned as to how long they can continue the record rate. Maintenance and repair problems become more pressing as winter appears. Scrap becomes harder to get in cold weather. Conversion arrangements are mounting as consumers try every avenue to get more steel, but such deals require excess rolling mill space and it's hard to find.

As a result, production lines for some consumers have had to be cut and new business refused because of slow or reduced deliveries from the mills. Medium and small size plants have been worst hurt because of lack of priorities. Most serious shortages have been in hot rolled sheets, carbon steel plates, and structurals.

But it's not only the smaller plants that have been affected. The Pullman-Standard plant was obliged to reduce its railroad freight car building program by one-third because of shortage of plates. Shortage of structurals is delaying many construction jobs.

One effect of the steel scarcity has been to bring back many small marginal mills, normally unable to compete unless they obtain premium prices. Gray markets for steel products are not yet prevalent, but it would be no surprise if they appear soon.

## Prices to Rise for Steel?

With demand so strong there are guarded forecasts by prominent steel executives that a price advance is on the way. Although it is only a little more than three months ago that the general price level was advanced following the wage increase, it is felt that this by no means covered all costs, the full impact of which will not be felt for some months yet. Prices for a few special products already have been raised without meeting consumer resistance. Steel producers think there would be little resentment from a price hike if only

deliveries could be speeded. On the other hand it is realized there are political and inflationary aspects to a price increase that counsel a go-slow attitude.

## Financing Steel Expansion

But steel leaders are on solid ground when they inquire where the money is coming from to pay for the formidable expansion program they have in mind over the next decade without a price increase. It appears to be generally agreed that an expansion of at least 15 million tons in capacity is called for. The cost is variously estimated at \$2.4-3 billion dollars. This huge amount cannot be obtained, steel leaders say, from retained earnings or depreciation charges. Nor can aid now be expected from rapid amortization as formerly permitted. The only feasible source is equity financing and to attract this kind of money profits must be high enough to whet the investor's appetite. This means higher prices for steel products to insure such improved profits.

## Allocation Plans Ahead

Producers are attempting to allocate steel fairly for the first quarter of 1956 in an effort to put lagging deliveries on a current basis. Inland Steel will try to allocate on the basis of customers' purchases during the first quarter of 1954, which was a normal period for Inland. At present the company's deliveries are from two weeks to two months behind schedules. Customers can take their first quarter tonnage from orders already on file, or they may substitute new orders. By the end of March, it is hoped orders and deliveries will be on a current basis.

## Demand Holds for Molybdenum

Manufacturers of alloy steels are enjoying excellent business. This is especially true for special steels using molybdenum. The leading trade factor for this metal reports demand has been so good it has petitioned Washington to defer deliveries required under terms of a Government contract in order to supply insistent trade demands. Officials declare they are confident their entire output in 1956 can be sold to industrial users here and abroad when the Government contract expires next June.

## No Bargain Price for Nickel

More nickel will be available to industrial users through a release of 2,200,000 lb by the Government  
(Turn to page 126, please)

on an

*Acme-Gridley*

FULLY AUTOMATIC BAR TYPE TURRET LATHE

**you can machine this finger-  
holder spool in 3 minutes**

**... and do it all day long!**



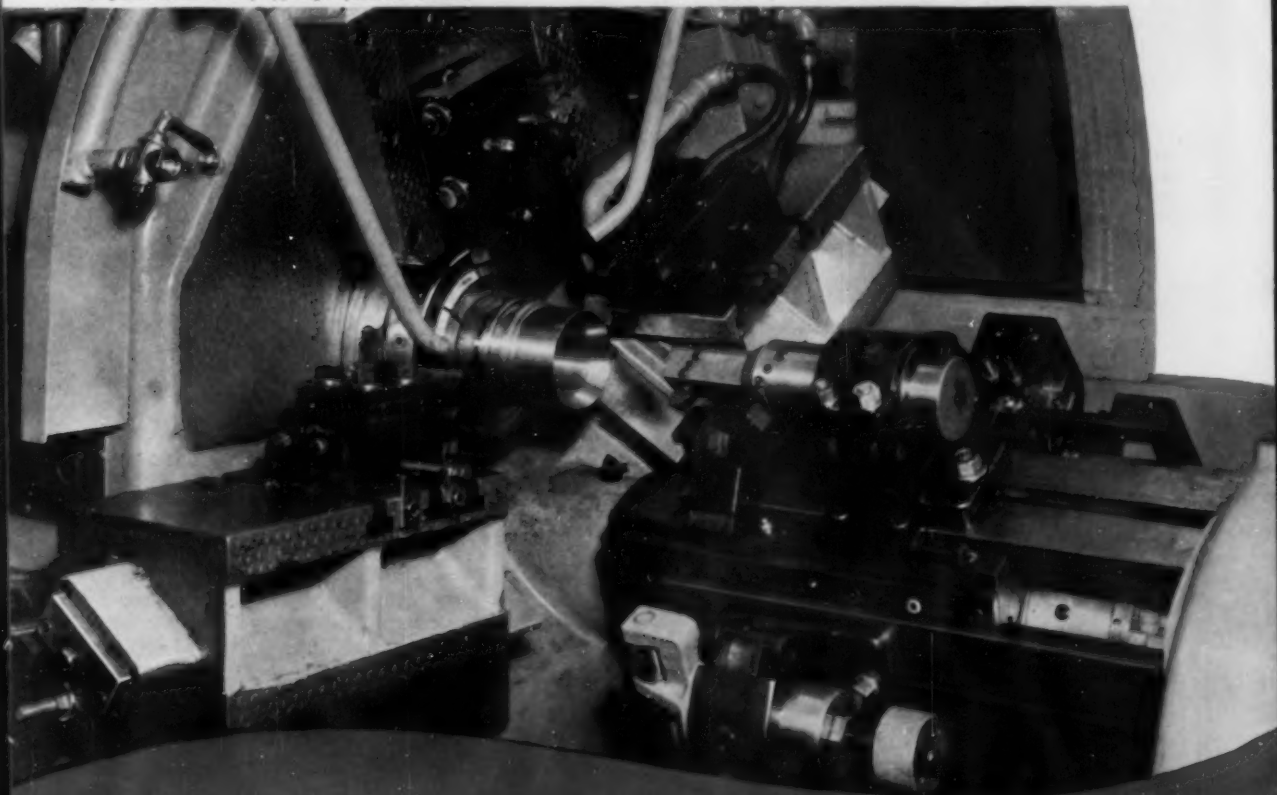
Material—4620 Steel Tubing  
Machine Time—3 Minutes  
Number of Operations—15, including  
angular turning attachment, carbide  
tooling throughout.

Here's the answer: Dependable, automatic control of the work cycle . . . production is always at the same predetermined rate. Also, on the ACME-GRIDLEY Single, you complete more operations on the primary tooling setup—the best way to get greater accuracy, save time and save floor space. And one man can operate two

or more machines, depending upon the cycle time of the work involved.

Why not learn more about the machine that made such a big hit at the Machine Tool Show? Get the full details in Catalog M-50A . . . then you'll want to discuss your production with a National Acme engineer.

Tooling zone on Acme-Gridley 4 1/4" Single Spindle Bar Automatic



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CLEVELAND 8, OHIO

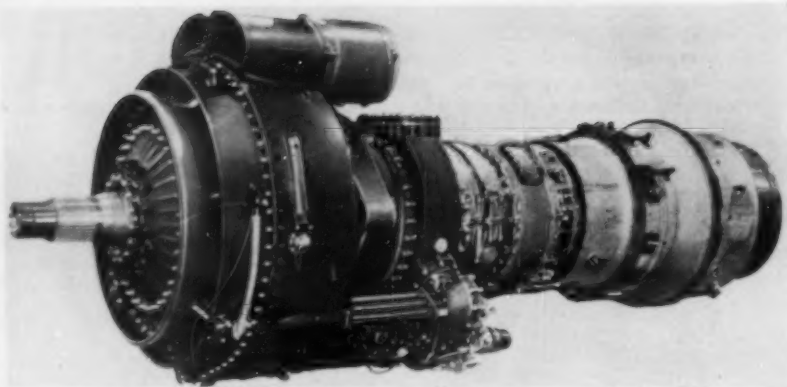


## New Rolls-Royce Turboprop

To Power

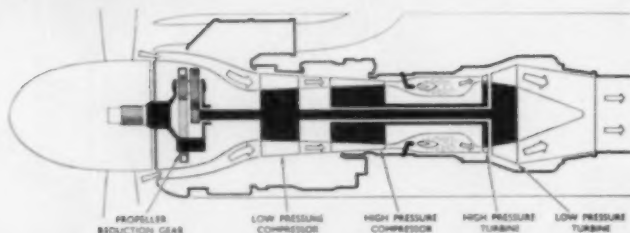
**VICKERS  
V-900  
PLANE**

Vickers V-900 Vanguard which will carry up to 105 passengers and cruise at 425 mph. Maximum planned range is 2500 miles.



The Rolls-Royce RB.109 is rated at 4470 total ehp, with 4020 shp and 1175 lb thrust. The oil tank surrounds the annular air intake and central reduction gear.

Layout and flow diagram of the Rolls-Royce RB.109 turboprop engine is shown at right.



**B** RITISH emphasis on turboprop airliners is indicated by the announcement that British European Airways (B.E.A.) is negotiating with Vickers-Armstrong for a substantial number of V-900 Vanguards. A few details of this new medium-range 93/105-passenger transport have now been disclosed.

Engine is the Rolls-Royce RB.109 Tyne. Departing from the single-shaft layout of the Dart, it is of two-pool design and develops much greater output. A take-off rating of 4020 shp combines with 1175 lb thrust to give a total of 4470 ehp. Specific wgt is 0.42 lb/ehp compared with 0.57 for the RDa.7 and 0.636 for the Dart.

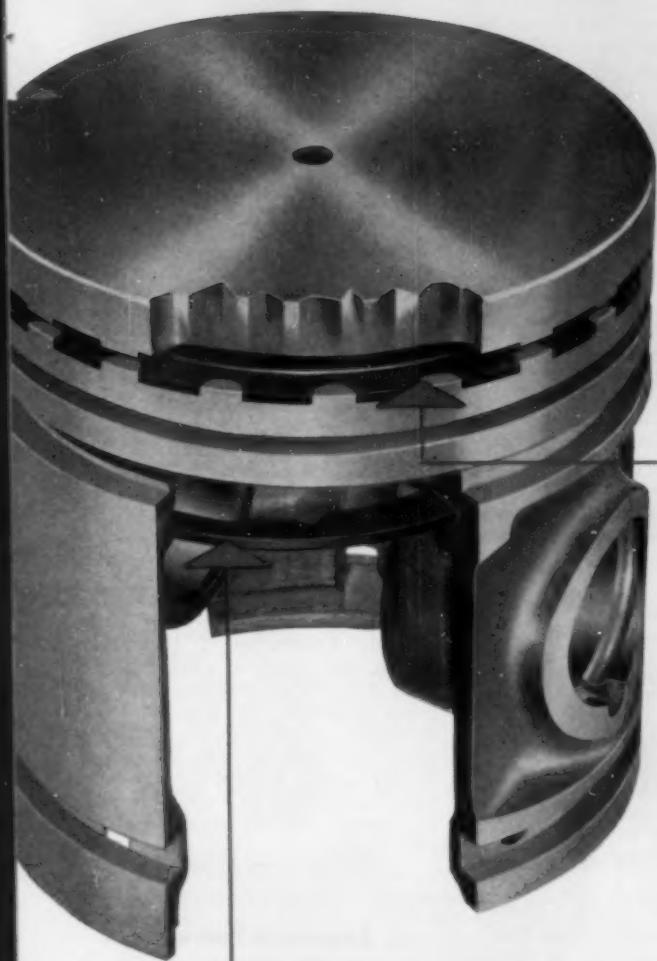
Pressure ratio reaches 12 to 1, and the annular combustion system is of extremely small diameter. The

circular air intake, integral with the oil tank and with oil cooler mounted above, encloses the compound-epicyclic reduction gear driving the propeller shaft. Overall height is 40.5 in., width 37.4 in., and length 97.15 in. Net dry weight is 1880 lb.

Four of these engines will give the V-900 a cruising speed of 425 mph. Its longitudinally creased fuselage is 117 ft, 10 in. long, and has two large freight compartments in the lower bubble. The Vanguard is designed for high-density routes over sector distance from 500 to 2500 miles. Maximum payload capacity on short stages is stated to be 21,000 lb. Production has already started, and the first aircraft are scheduled for delivery in early 1960.

# NOW!

## STERLING CONFORMATIC PISTONS



**CONFORMATIC STEEL CONTROL MEMBER**, anchored at the pin bosses only, controls skirt clearance... hot or cold! The metered steel insert allows you to specify the piston clearance you want for your engine. (Clearances from zero to  $\frac{1}{2}$  thousandth inch are generally recommended.)

are  
available with  
**LOW COST**

## Intra-Cast<sup>\*</sup> STEEL-LINED GROOVES

*Steel protection—top and bottom—gives sensationally longer life to rings and grooves.*

This ring is *integrally cast* into the piston... positioned so that when the grooves are machined, the top ring groove is *lined with steel* and has islands of aluminum for ring cooling. This Intra-Cast steel-protected groove resists enlargement and materially reduces top ring land wear and rounding. And, it does it at far less cost than other methods.

\* Tradename Registered

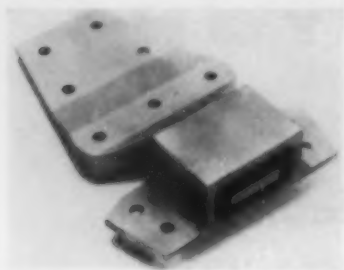
**STERLING ALUMINUM PRODUCTS INC.**

(ST. LOUIS, MISSOURI)

Why the first one turning has

## Shock Mount

Aluminum and rubber sandwich support bracket and shock mountings have been developed to support after-body engine sections of the Lockheed



model 1049 A Super Constellation. Operating under conditions of high frequency vibrations caused by the engine reduction gear train, the Flex-mount is designed to withstand applied loads in shear and additional resultant loads caused by engine vibrations. These loads are taken out by 1 1/4-in. diam bolts, with the vibration completely absorbed by a Neoprene rubber core 1-1/16 in. high by 1 1/4 in. wide by 1 1/4 in. deep bonded to the aluminum. The rubber can be replaced when worn. *Stillman Rubber Co.*

Circle 31 on postcard for more data

## Contact Point

A so-called "ventilated" distributor point is claimed to have a longer life than those used heretofore. The ventilation feature is a very small hole punched in the tungsten contact. Air pumped through this hole by the vibration of the distributor arm reduces the effect of the arc, resulting in more even metal transfer. This decreases peaking and pitting, according to the maker. The firm has designed a machine which punches thousands of these new contacts an hour, heating above a critical temperature as they enter the machine. Another high-speed machine coins sharply rounded surfaces on tungsten contacts for certain electrical devices. The shaping has been done heretofore by grinding. *H. A. Wilson Co.*

Circle 32 on postcard for more data

## Insulating Tape

Crepe paper insulating tape for winding field coils of fractional horsepower motors, low-voltage generators and automobile starters has been de-

veloped. This new tape, made from high density, electrical grade kraft with a dielectric rating of 1250-1500 volts, is reported to provide sufficient insulation without varnishing and baking in many cases.

The tape is creped to give it a 50 per cent stretch. This stretchable property results in such a snug fit around coil corners and leads that grounds from voids are reported to be fewer than with less electric materials. The tape is rated at 54 lb tensile on a one-in. strip. It is available in standard widths, either plain or impregnated with a wax oil solution. It can be applied on standard taping machines. *Dennison Manufacturing Co.*

Circle 33 on postcard for more data

## Power Steering

Electrically controlled power steering system for aircraft, recently developed, combines proven servo mechanism principles with a compact and flexible steering and damping device. The system eliminates control linkages. Electronic components are lightweight, separate units and can be mounted in any location. Multiple stations can enable the co-pilot and other flight personnel to take over the



steering function from the pilot when desired.

Steering control can be obtained from the rudder pedals or hand wheel. The forces required can be varied from almost zero to the exact value providing the proper steering "feel." Steering response is accurate and instantaneous; backlash is eliminated, reports the manufacturer.

The system incorporates safety requirements including "fail safe" features in the event of an electric power or hydraulic failure, so that any possible disabling of the steering control system will not jeopardize a safe landing with full shimmy protection. *Aviation Div., Houdaille-Hershey Corp.*

Circle 34 on postcard for more data

## Long Plug

Long-reach 14 mm spark plug N 18 is to be original equipment in the 1956 Packard, Studebaker "Golden Hawk" models and Nash and Hudson



V-8 engines. Design features include seating the insulator above the outside gasket, to prevent damage to the core as the result of excessive torque in installation; a wide heat range, long insulator core nose to resist fouling, sillment seals and the five-rib insulator. *Champion Spark Plug Co.*

Circle 35 on postcard for more data

## Safety Pad

A safety pad for automobile instrument panels, with a decorative, soft textured cover, has been developed. Constructed of Fiberglas molded wool, with a vinyl plastic cover, the pads are available in many colors and grains. The firm said it is developing similar pads for installation above windshields and for backs of front seats. Because of its semi-rigid construction, the material needs no support. *Owens-Corning Fiberglas Corp.*

Circle 36 on postcard for more data

## Sequence Valves

Series 4000 slide-type sequence valves for 3000 psi hydraulic service are said to feature extremely low leakage and low pressure drop. Stock models have a standard maximum internal leakage of 15 drops per minute. Special models are available with maximum leakage values as low as five drops per minute.

Valves are designed with a fully balanced, self-cleaning spool which is selectively lapped into a rigid sleeve. The entire spool assembly is hydraulically balanced to prevent possibilities of binding. *Aircraft Products Co.*

Circle 37 on postcard for more data

# Why the first gas turbine bus uses a Pesco fuel pump

Gas turbine transit bus, first of its kind, uses a 325-horsepower single burner turbine instead of the conventional diesel engine. Power plant engineers solved problem of fuel pump performance and service life with Pesco unit.

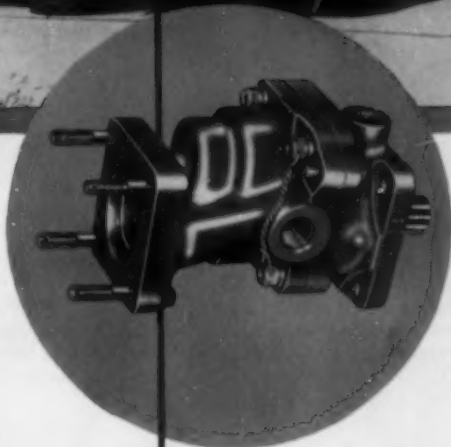


Are you developing or producing gas turbine engines for automotive, marine, aircraft or industrial applications? Then it will be of essential interest to know why the world's first gas turbine bus uses a Pesco High Pressure Fuel Pump.

On this radical new bus, the Pesco pump provides a continuous and dependable flow of fuel over an extended service life. It operates at sustained high volumetric efficiencies in spite of (1) the relatively high fuel system pressures encountered with gas turbine engines and (2) the inherent lack of lubricating value of the fuel.

The reason for such superior performance is the exclusive Pesco principle of pump design—"Pressure Loaded" bearings. This feature maintains continued new pump performance by automatically compensating for wear. It also assures constant pumping characteristics regardless of changes in temperature, viscosity or load.

Pesco, foremost producer of fuel pumps for aircraft jet engines, can supply fuel pumps for any type or size of gas turbine equipment. We will be pleased to work with you in developing a fuel pump to meet your specific requirements. Why not call in a Pesco sales engineer today. Contact: PESCO, 24700 North Miles Road, Bedford, Ohio.



Model 022816 High Pressure Fuel Pump, being used experimentally on gas turbine bus, is an engine-driven, gear-type unit. Compact in design and weighing only 3½ pounds, it is rated at 2.3 gpm at 3000 RPM at 650 psi.



**BORG-WARNER CORPORATION**  
24700 NORTH MILES ROAD • BEDFORD, OHIO



Aluminum for truck-trailer bodies and other automotive products may be a bit more plentiful in the first half of 1956. Government has decided not to demand any aluminum for the national stockpile during the first and second quarters, so an additional 400 million lb should become available to fabricators.

Supplemental data covering dimensions of gage blanks, frames, and fittings, to be used in conjunction with the 1951 commercial standards for gage blanks, are now adopted by industry and approved by the Government. Copies of the new standards are available from the Superintendent of Documents, Washington 25, D. C., for \$0.10 each.

Facilities where the first atomic-powered airplane may be built will be constructed by NACA. Using a \$4.8 million authorization, the agency will put up a special atomic laboratory in Cleveland, O.

Internal Revenue Service, in an attempt to clarify its position on tax treatment of various types of machinery leasing and lease-purchase contracts between suppliers and business, has issued three new guides. Requests for copies should be addressed to the Tax Rulings Div., Internal Revenue Service, Washington 25, D. C.

Production of tanks for the Army moves ahead at a reduced rate with the awarding of a \$73 million contract for M-48 Patton medium tanks to Alco Products, Inc. This is the only tank contract to be placed this fiscal year, the Army says.

Closing of 32 more industrial plants or facilities is being proposed by the Defense Department. Appropriations Committees of the Senate and the House will have the last word on the matter, however.

Government will spend up to \$70 million in a new program to buy tools and production equipment for eight U. S. companies. They manufacture steam turbines and turbine gears.



Today there are more than 58 million motor vehicles registered, one for every 700 ft of every lane in both directions on all streets and highways in the nation.

Big four-engined planes can take over 5000 gal of gasoline at a fueling, and burn it up at a rate of 600 gal an hour.

If all rural highways and roads and city streets in the U. S. were laid end to end, they would circle the globe at the equator 135 times.

A new tubeless airplane tire is capable of withstanding the shock of landings at 300 mph with an impact load of about 10,000 lb.

The average 1955 model passenger car uses 22.8 light bulbs, compared to 20 just two years ago.

About 70 per cent of all the rubber used in the U. S. today is synthetic rubber made from crude oil or natural gas.

On an average business day, nearly one million Americans invest more than \$250 million of savings in a variety of financial enterprises.

## CALENDAR

### OF COMING SHOWS AND MEETINGS

Chemical Specialties Manufacturers Association, Hotel Roosevelt, New York, N. Y. . . . . Dec. 5-7  
SPI Film, Sheet, and Coated Fabrics Div. Conference, Hotel Commodore, New York, N. Y. . . . . Dec. 6-7  
International Atomic Exposition, Public Auditorium, Cleveland, O. . . . . Dec. 10-16  
Material Handling Institute, annual meeting, Statler Hotel, New York, N. Y. . . . . Dec. 12-13  
Nuclear Engineering and Science Congress, Public Auditorium, Cleveland, O. . . . . Dec. 12-16

#### 1956

First Mexican International Automobile, Motor, and Cycle Show, Mexico City . . . . . Jan. 1-10  
Chicago Automobile Show, Chicago, Ill. . . . . Jan. 7-15  
SAE Annual Meeting, Sheraton-Cadillac and Statler Hotels, Detroit, Mich. . . . . Jan. 9-13  
National Motor Boat Show, Kingsbridge Armory, New York, N. Y. . . . . Jan. 13-22  
Society of Plastics Engineers, annual conference, Hotel Statler, Cleveland, O. . . . . Jan. 15-20  
NADA Annual Convention, Washington, D. C. . . . . Jan. 28-Feb. 1  
AIEE Winter General Meeting, Hotel Statler, New York, N. Y. . . . . Jan. 30-Feb. 3  
Automotive Accessories Mfrs. of America Exposition, Navy Pier, Chicago, Ill. . . . . Feb. 6-9  
SPI Reinforced Plastics Div. Conference, Hotel Chalfonte-Haddon Hall, Atlantic City, N. J. . . . . Feb. 7-9  
NSPA Convention, Mark Hopkins Hotel, San Francisco, Calif. . . . . Feb. 21-22  
Pacific Automotive Show, Civic Auditorium, San Francisco, Calif. . . . . Feb. 23-26  
SAE National Passenger Car, Body, and Materials Meeting, Hotel Statler, Detroit, Mich. . . . . Mar. 6-8  
Geneva Automobile Show, Switzerland . . . . . Mar. 8-18  
National Association of Corrosion Engineers, annual convention, Hotel Statler, New York, N. Y. . . . . Mar. 12-16  
Association of National Advertisers, spring meeting, Homestead, Hot Springs, Va. . . . . Mar. 14-16  
SAE National Production Meeting and Forum, Hotel Statler, Cleveland, O. . . . . Mar. 19-21  
ASTE Industrial Exposition, International Amphitheatre, Chicago, Ill. . . . . Mar. 19-23  
SAE Aeronautic Meeting and Production Forum, and Aircraft Engineering Display, Hotel Statler, New York, N. Y. . . . . April 9-12  
National Packaging Exposition, Convention Hall, Atlantic City, N. J. . . . . April 9-12  
MPA Annual Meeting and Metal Powder Show, Hotel Cleveland, Cleveland, O. . . . . April 10-12  
National Petroleum Institute, semi-annual meeting, Cleveland Hotel, Cleveland, O. . . . . April 18-20  
Turin Motor Show, Italy . . . . . April 21-May 2  
British Industries Fair, London and Birmingham, England . . . . . April 23-May 4  
International Automobile Show, Coliseum, New York, N. Y. . . . . April 28-May 6



## Dodge selects Enjay Butyl rubber for big rear-window weatherstrip

Super-durable Enjay Butyl fits perfectly Dodge's rigid specifications for its rear-window weatherstrip. Under the toughest conditions of weather and use, Enjay Butyl parts stay like new, help add style and color to new cars. In fact, some automobiles have more than 100 parts made of this fabulous rubber.

The many advantages of Enjay Butyl make it the almost perfect rubber for the automotive industry. Its price and ready availability are advantages, too. And it is now available in non-staining grades for *white* and *light-colored* parts. For full information and for skilled technical assistance in the uses of Enjay Butyl, contact the Enjay Company at either of the addresses below.



**ENJAY COMPANY, INC., 15 West 51st Street, New York 19, N. Y.**  
District Office: 11 South Portage Path, Akron 3, Ohio.



Enjay Butyl is the super-durable rubber with *outstanding* resistance to aging • abrasion • tear • chipping • cracking • ozone and corona • chemicals • gases • heat • cold • sunlight • moisture.

**35 SUCCESSFUL YEARS OF LEADERSHIP IN SERVING INDUSTRY**

AUTOMOTIVE INDUSTRIES, December 1, 1955

105

# INDUSTRIALIZATION

BEHIND THE

## BAMBOO CURTAIN

(Continued from page 68)

formation and actual manufacturing advice supplied by Russia.

Structural framework for the cold-drawing workshop, the last shop to go up at the plant, was completed several months ago, and all the buildings are due to be completed before the end of 1955. In something like two years, 10 major buildings as well as warehouses and auxiliary workshops, have been put up by assembling factory-made reinforced concrete parts, steel structural frame parts, and prefabricated brick blocks. Most of the earthwork has been handled by mechanical means—scrapers, excavators, bulldozers, and self-dumping cars supplied in the main by the Soviet Union and the East European countries.

By July of this year, eight auxiliary workshops of the plant had started trial production. They will supply measuring instruments, dies, chucks, and various other tools and equipment for the plant. By August, three of the workshops were reportedly turning out more than 1000 varieties of tools to supply the car production workshops. In the same month eight workshops of the chassis and nonferrous metalworking departments began trial operations.

By the end of 1955, according to latest reports, installation of machinery in six workshops and the heat and power station will be completed. Latest-type Soviet steam turbine generators have been installed in the power plant, which is to supply power and steam to the automobile plant, as well as to other factories and mines in the area.

Chief supplier of machines and equipment for the plant has been the Soviet Union. Large numbers of Chinese workers, technicians, and managers have, in fact been sent to the Stalin Automobile Plant in Moscow "to learn their jobs in workshops equipped with the kind of machinery at Changchun."

At the same time, however, important contributions have also been made by China's East European trading partners, and especially the two

with the most advanced automotive industries outside the Soviet Union—Eastern Germany and Czechoslovakia. By formal agreements, China and all the East European countries are now engaged in regular scientific and technological exchanges. The assistance that the East European states have been rendering to the Chinese has largely taken the form of technical information and specifications for heavy and precision machine tools, Diesel engines, electric furnace alloy steels and various heavy machines and plants. German, Czechoslovak, Polish, Hungarian, and Roumanian technicians have all visited China to assist with the putting into production of many machine tools not previously made in the country.

The result is that Chinese industry itself has made a significant contribution to the equipping of the Changchun plant, as well as the building of it. China's steel output is expected to reach 4.12 million tons by 1957 (the 1952 target is 10 million tons). More than half the steel products being supplied to the Changchun project this year will come from the Chinese industry, particularly the big Manchurian plant at Anshan. Even when work started at Changchun in 1953, domestically produced steel accounted for about 30 per cent of all that was used.

According to the Peking press, something like 10,000 machine tools and other items of equipment made in China have so far been supplied to Changchun, including hoists and transport and electrical equipment. Ultimately, the extent to which Chinese factories will contribute to equipping the plant is likely to be impressive. The country today is turning out many products that have gone into regular production for the first time in recent years—semi-automatic lathes, planers, a cylinder and cone grinding machine, five-ton automobile cranes, 300 hp Diesel engines, precision grinders, milling cutters, hobs, and measuring instruments.

Last year, for instance, factories

in Shanghai and other leading engineering centers turned out for the first time a precision boring machine with boring bars of 3.35 in. diameter, a precision grinding machine with hydraulic transmission, a special multi-cutter semi-automatic lathe, and rubber tires of 12-in. cross section width and 22-in. rim diam.

A precision and cutting tool plant in Harbin, second only to Shanghai as a machine building center, started production at the end of 1954. Another Harbin factory has started production of complete sets of electrometers for the Changchun plant.

China actually produced her first precision universal grinding machine in 1950. In the following year the country's first heavy boring machine was turned out in Shanghai. The manufacturing plant was re-equipped with Soviet and Czechoslovak machines in 1952 and now supplies precision grinders to about 400 factories all over China.

Since construction began at Changchun many Chinese factories have been tooling up to produce automobile parts, over 400 items in all, including bearings, electrical equipment, springs, and fittings. China is to supply all the steel, timber and glass that the plant will use, and only a few types of special metals will come from the Soviet Union and Eastern Europe.

A new factory is being built to supply tires to the plant. Largest existing tire factory in the country is in Tsingtao. It makes heavy-duty tires, including Model 1200-20 for 13-ton, six-wheel trucks and Model 1200-22 for the 44-passenger buses used in Peking.

Apart from groups undergoing training at the Stalin Moscow plant, 3000 workers for Changchun are being trained in China at three Manchurian technical schools. At present, China's first school for the training of automobile and tractor engineers is being built in Peking; the departments of metal cutting and tractor engineering started operating in 1954. Automobile construction is also one of the subjects dealt with in regular lectures for skilled workers organized by a Peking Association for the Dissemination of Scientific and Technical Knowledge.

Location of China's first tractor plant has not so far been revealed. Preliminary work on the site, including construction of a special railway link, began about a year ago and the foundation stone was laid in September, 1955. The plant, scheduled to be finished in 1959, is to be equipped

(Turn to page 122, please)

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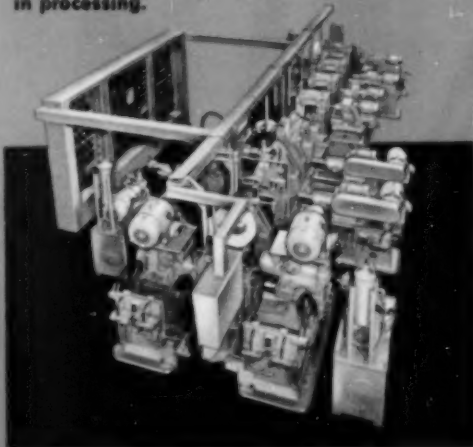
# SNYDER

**TOOL & ENGINEERING COMPANY**

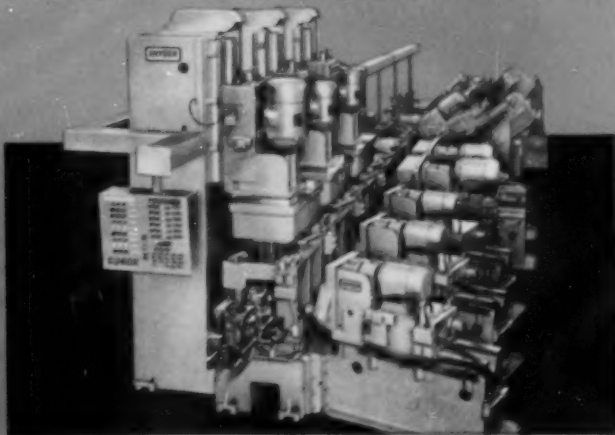
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**SEGMENT 1:** 40 feet long, 19 stations, 10 spindles. Part manually loaded, both ends face milled, counterbored, three diameters rough and finish bored and faced, two pads side milled, pump pad face milled, clearance slot milled. Part tilted 90 degrees in processing.



**SEGMENT 2:** 47 feet long, 31 stations, 91 spindles. In top face, end and at angular locations inside, 51 holes are drilled, countersunk, semi-finish and finish reamed, spot-faced, tapped. Part is tilted 90 degrees end related.





**SNYDER TOOL and ENGINEERING COMPANY**

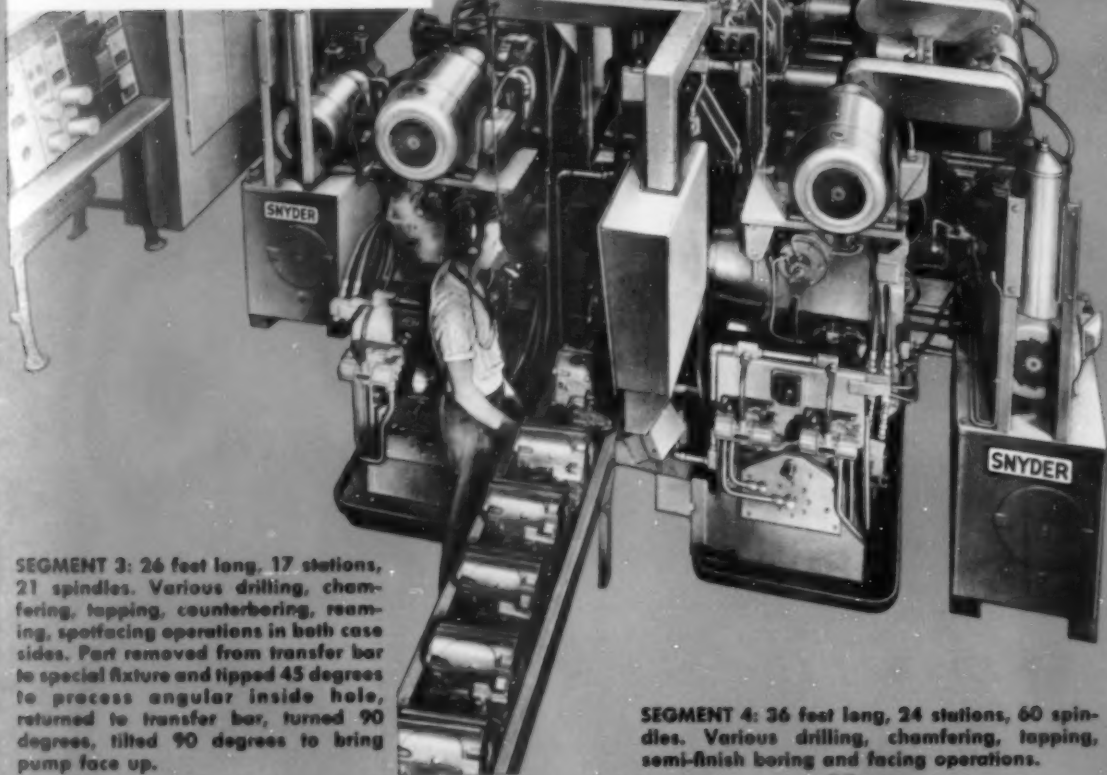
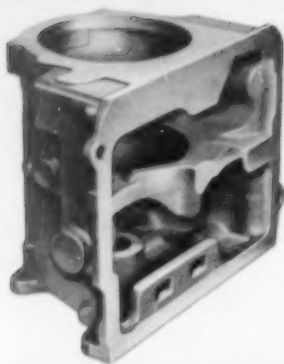




**Y** As a fitting climax to our thirtieth anniversary year, we are happy to announce plant expansions which will add about one third to our machine shop and assembly floor areas and which will enable us to add to our precision machining equipment and accommodate more

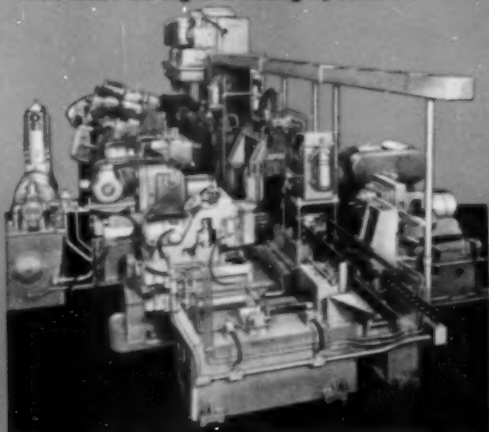
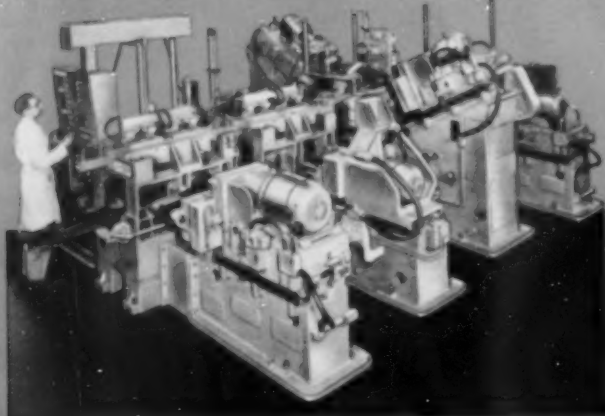
manpower. We are happy, too, to take this opportunity to thank all our friends who have made this modern plant possible—our customers, our suppliers and all of the hundreds of members of the Snyder family of workers, here and throughout the country.





**SEGMENT 3:** 26 feet long, 17 stations, 21 spindles. Various drilling, chamfering, tapping, counterboring, reaming, spotfacing operations in both case sides. Part removed from transfer bar to special fixture and tipped 45 degrees to process angular inside hole, returned to transfer bar, turned 90 degrees, tilted 90 degrees to bring pump face up.

**SEGMENT 4:** 36 feet long, 24 stations, 60 spindles. Various drilling, chamfering, tapping, semi-finish boring and facing operations.



## ASBE Convention

(Continued from page 96)

floor materials, cushioning materials and preformed materials was given by G. H. Callum, U. S. Rubber Co. Methods of manufacturing Breathable Naugahyde, foam, and vacuum-formed materials were shown in short motion picture. Among the newest products is an unplasticized or low plasticized vinyl sheeting and metal laminates combined or laminated with the Marvibond process. Metal so laminated can be drawn, stamped and punched without harming the vinyl coating.

Problems in appliquéing soft brush-finished aluminum to roof panels were discussed by R. C. Dye of Olin Mathieson Chemical Co. As used on a Cadillac display car, the process involved considerable hand finishing. To mate the aluminum to the steel roof at the braze line seemed to be the greatest problem. The appliqué was also bonded with material designed as a sealer for aircraft fuel tanks. This work was conducted by the Reynolds Metals Co.

Two papers were presented on testing new designs. F. J. Finkenauer of Chrysler Corp. outlined the work of the Laboratories Section of Central Engineering at Chrysler as progressing in this order on bodies: seating, glass, sealing, mechanisms, structure and welding. An interesting recent development was a method of mounting the windshield and rear window. The weatherstrip is designed to enable the glass to float in both directions in the body opening, thereby absorbing body and glass variations. Outlining the testing program at Oldsmobile, the paper by D. C. Perkins and C. D. Harrington pointed out that testing of a new body is divided into three phases. A fleet of test cars is simultaneously going through the phase of road testing, structural testing, and cross-country observations. In the road testing phase at the proving grounds, endurance records are carefully kept on such things as adjustment required on doors, and failure reports on components, in addition to the usual check of gasoline and oil consumption. Structural testing usually follows the results of the durability tests at Fisher Body and within Oldsmobile's own Engineering Dept. The former usually compares the body structure against other base-line units, whereas in Oldsmobile testing, the concern is with the new frame and body as compared to a production car. Cross-country observations get away from the severity of certain-destruction schedules.



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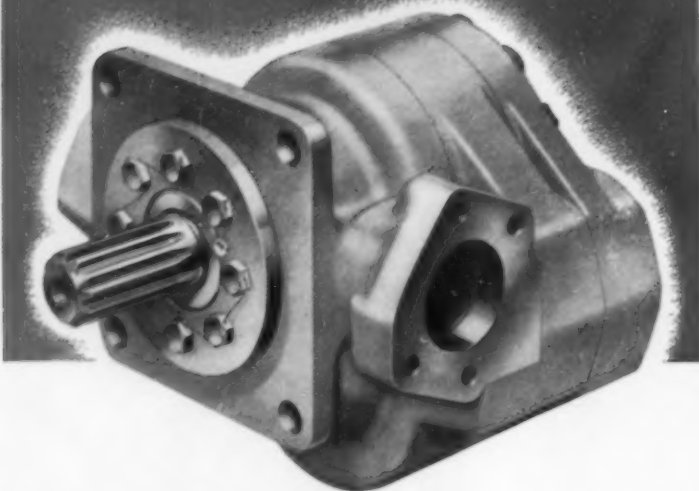
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## Aircraft Equipment

(Continued from page 69)

G. Alesbury, Vickers-Armstrong, Ltd., described the simple hydraulic system of the Viscount Type 745 airplane in some detail. These details doubtless are familiar to our readers since the type under discussion is based upon the 1947 design. Briefly, the Viscount eliminates sequence valves and relies upon mechanical linkage to open and close landing gear doors. The hydraulic system is designed to take care of chassis retraction and lowering of the entire system, chassis lowering by an independent emergency system, wheel brakes, and nose chassis steering.

R. Hoffmaster, Capital Airlines, made some extremely complimentary remarks as to the operation of their Viscounts stressing the simplicity, reliability, and accessibility of the Viscount hydraulic system for servicing.

In describing current and future developments in hydraulic pumps and motors, K. I. Postel of Vickers outlined some of the research work now under way, mentioned the work being done on the development of a dual range pressure control component to be available in the near future. Vickers also is doing work on the miniaturization of components to reduce their size and weight.

One of the major contributions was a paper by Edward I. Brown, chief engineer, aircraft products division of Vickers, aimed primarily at current and future developments in aircraft valves and systems. Among other things he touched on the use of a hydraulic transmission with jet engines for driving the generator of the electrical system. Another item was a proposal for driving superchargers hydraulically, leading to a study of an improved form of turbine drive. Vickers also is working on hydraulic systems of jet engine starting; and other accessories for jet engines.

Another interesting application of hydraulics is that of in-flight refueling of jet-powered airplanes in the future. Vickers would provide the hydraulic motors which drive the fuel transfer pumps, and hydraulic equipment to drive the hose reel in and out on the tanker airplane.

Finally Mr. Brown notes that the future aircraft hydraulic system must be well integrated in order to provide the maximum amount of accessory power with minimum weight. This could be accomplished by utilizing the same components for dual services and using the same hydraulic lines for both services.

impossible to machine long parts  
**AUTOMATICALLY** on your present equipment?

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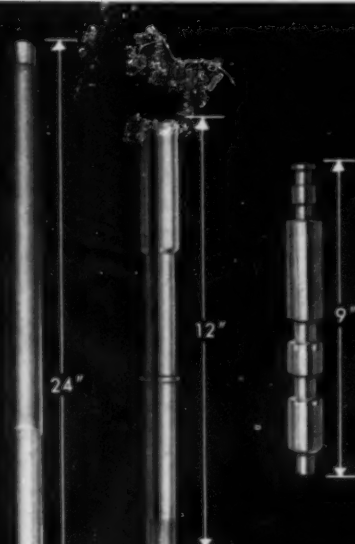
SIX-SPINDLE BAR

## AIR-FEED AUTOMATIC

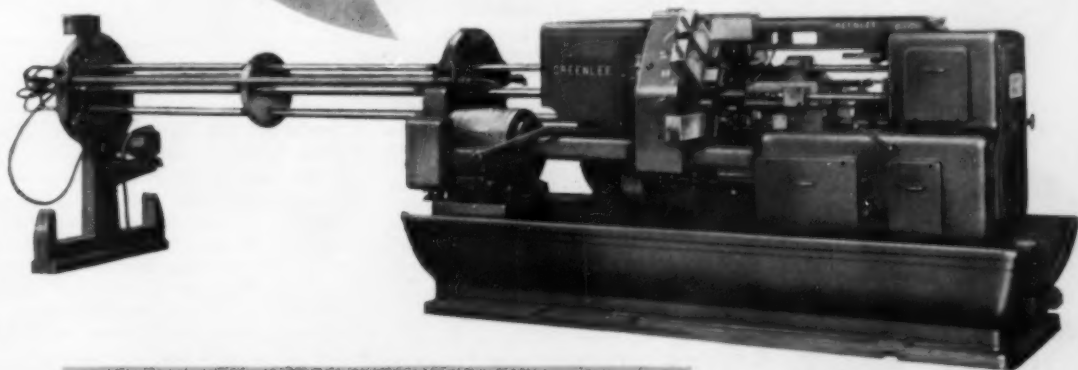
This machine puts you in an enviable competitive position. Production goes up... costs go down. Check its many advantages:

(1) Feeds out stock to 24" (2) Has multiple feed-out (3) Eliminates stock scoring (4) Reduces stock reel noise (5) Eliminates stock pushers and feed-out cams. Especially worth noting is the fact that the stock can be fed out in one or more positions during either the index cycle or feed cycle.

Additional data will gladly be sent on request. Write today.



Here are some typical examples of work done on this machine. Pieces up to 24" can be handled easily... at fast speeds.



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WRITE FOR  
COMPLETE INFORMATION

# Higher Power and Torque for 1956

(Continued from page 53)

streamlining all of the gas passages.

It is apparent that engine designers still have a long way to go in the employment of these devices before reaching practical limitations such as a limit to valve diameters and valve lift. Fortunately, the current design of V-8 engines has enormous flexibility. Where practical limitations are reached in some direction, it is always

feasible to increase displacement without any serious cost penalty even with the present use of costly transfer type manufacturing equipment.

On the other hand, considering the wave of safety drives, and widespread criticism of the continuing horsepower race, one naturally wonders just how far the drive for higher horsepower ratings will go. Only the

competing manufacturers have the answer.

From an engineering standpoint, there must be a practical limit as to the physical size of the powerplant of the future. Obviously, there is a limit to the displacement and installation dimensions of engines that already crowd the underhood compartment. Perhaps now is the time to consider engines of smaller displacement, utilizing some advanced form of turbocharger to boost horsepower rating.

Another important consideration is that of gas tank economy as contrasted with specific fuel economy. With the cost of gasoline at the highest levels, and exceedingly high in Michigan, many owners are concerned about the cost of car operation.

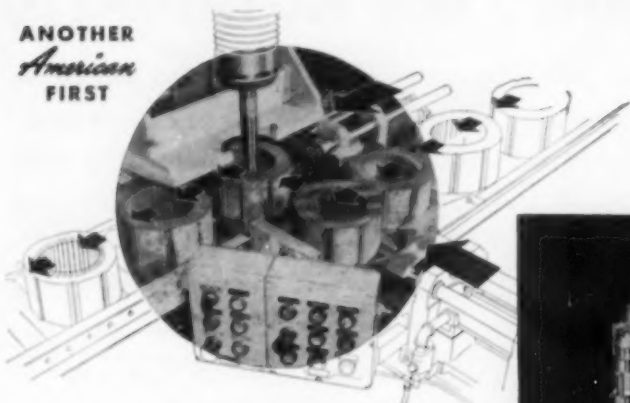
Five years ago when the horsepower race began in earnest, the largest engines in the most expensive cars gave promise of fuel economy that was better than that of smaller cars of past years. With succeeding increases in horsepower ratings, however, the actual tank economy has been going down to the point where 18 mpg is no longer common. In city driving, fuel economy has become quite low and is becoming a matter of concern.

In fact, many car owners are beginning to think in terms of lighter cars and smaller engines. Perhaps that explains the increasing demand for the small foreign cars, even though the actual population of such cars is too small to worry about at the moment.

Unquestionably there are new developments in the offing that promise improved economy without sacrificing performance or any compromise in the size of the big cars the public wants. One of these is solid fuel injection. From what we can gather, practical fuel injection systems are closer at hand and may be available in the near future. Although the mechanism is more expensive, volume production can do much to get costs down to a reasonable level.

We understand that turbochargers of advanced type will be available, capable of boosting engine output around 100 per cent. This would make it possible to build engines of much smaller displacement, although they will have to have a structure capable of coping with about the same loading as present engines. Here, too, cost is a major consideration but may be much more favorable with volume production. On the other hand, the combination of solid fuel injection and turbocharging may have enough favorable economies to justify higher costs at the outset.

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### STATOR PARTS BROACHED IN 20 SECONDS



Installed in a conveyor line, this American 3-way broaching machine with a hydraulic broach retriever and electrical controls, broaches the I.D. of stator parts in a 20 second cycle. Parts coming into the machine are automatically shuttled into position, broached, and then discharged back on the conveyor line. Interchangeable broach arbors and broach shells make it possible to broach several different parts of similar size.

### BEVEL GEAR BLANKS BROACHED IN 15 SECONDS



Using tooling similar to that illustrated, an American (FD) pull-down machine, installed in a conveyor line, automatically broaches the I.D. of a bevel gear blank in 15 seconds. By using interchangeable broach arbors and broach shells, over 20 similar bevel gear blanks are broached with this set-up.



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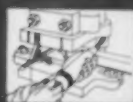


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with the world's broadest die set line. There's no need for compromise between the standard set you want and the set you can get, less need for costly specials. The new line of Danly Standard Die Sets has die space and guide post dimensions that equal, or exceed, ASA specifications. Under the new standards, front to back die space is measured from edge of bushing to front of die set.

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**Integral Welded Flange.** 100% used on all steel sets regularly furnished with flange gives greater strength and rigidity. Deep counterbores in punch holder have less tendency to weaken set.



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For full details on the many types of mechanical, chemical, electrolytic and paint film finishes that Reynolds offers and on the many other services offered by Reynolds, call the Reynolds office listed under "Aluminum" in your classified telephone directory. Or write Reynolds Aluminum Fabricating Service, 2087 South Ninth Street, Louisville 1, Kentucky.



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See Reynolds New Program "Frontier"—Sundays on NBC-TV.



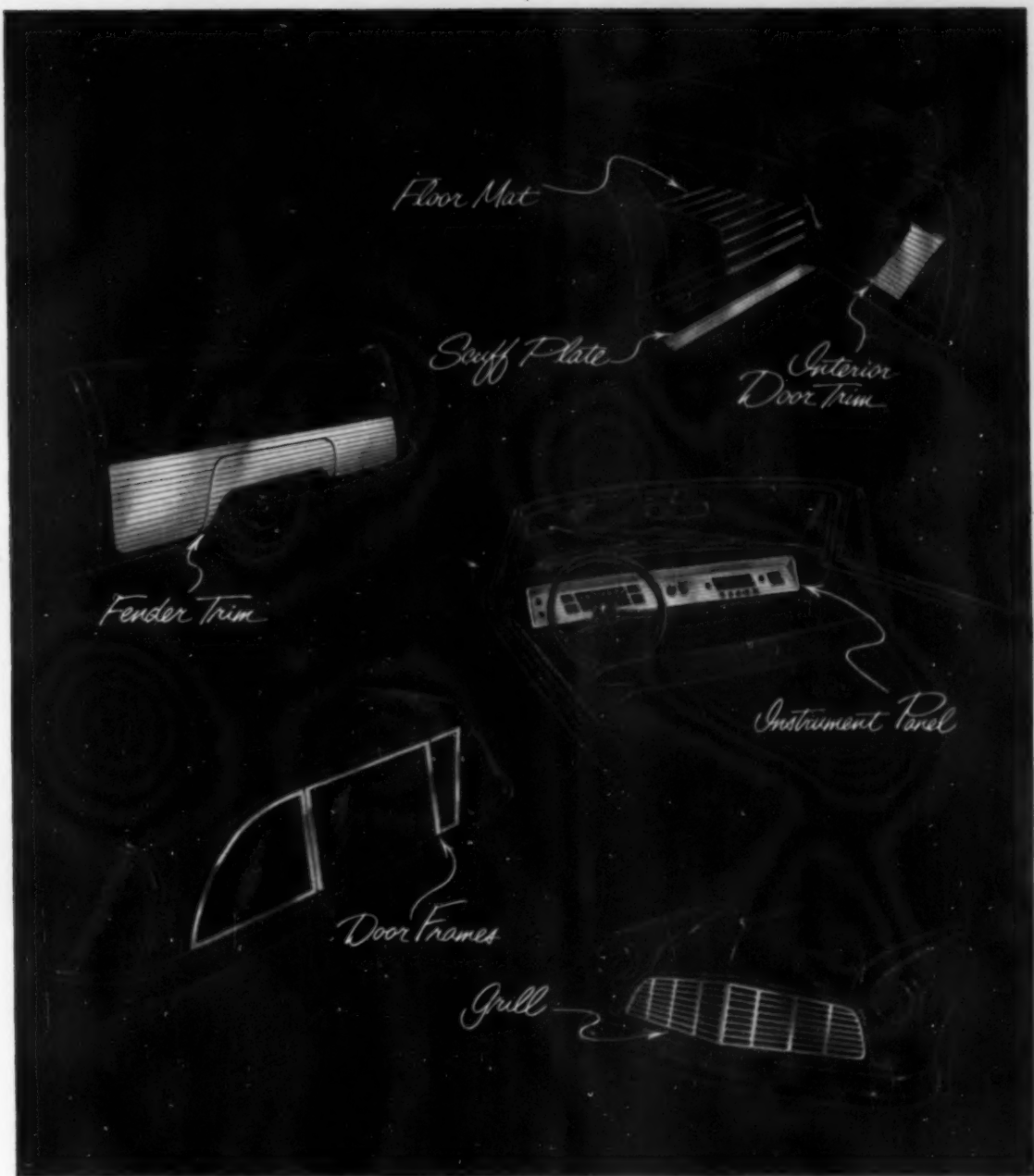
Completed parts, like these extruded aluminum window frames produced by Reynolds are finished to automobile manufacturers' exacting specifications.



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# HASSALL

SINCE 1850



NAILS, RIVETS, SCREWS  
AND OTHER COLD-HEADED  
FASTENERS AND SPECIALTIES

## AUTOMATION News Report

(Continued from page 71)

designing will tend to become more inflexible. But it felt that automatic machinery should have adaptability. Industrial designers are increasingly concerned about the greater investment required in capital goods. Standing up for the public requires taking a stand against a declining plateau of good taste in design. This decline, agreed the panel, results in part from industry's ever greater investments in inflexible capital equipment. One solution suggested minimizing investment in the "variable" portion, such as tools and fixtures, and maximizing investment in "fixed" portions such as presses and machine tools.

### COMPANIES: BULLISH

Clevite Corp., Cleveland, has become full owner of Transistor Products, Inc., Waltham, Mass. The new division will be known as Clevite Transistor Products, with Dr. R. B. Holt continuing to head up the operation.

Industrial electronics products will be engineered and manufactured at a new Baltimore department of the Westinghouse Electric Corp. Manager Robert C. Cheek announced the new unit, part of the industrial heating division of Meadville, Pa., will make induction heating equipment and a variety of electronic devices.

Pilot production of the new diffused base transistor is announced at the Motorola - Phoenix, Arizona Research Laboratories. For very high frequencies, the latest Bell Laboratory development is scheduled to be in volume production only after a year or more, as means for semi-automatic production are developed.

Merger plans will be worked out in detail between Square D Co. of Detroit and Electric Controller and Manufacturing Co. of Cleveland, announced presidents F. W. Magin and A. G. Patterson recently.

### LATHE: PROGRAMMED

Automatic electronic sequence programming equipment has been developed for Monarch lathes. The Numerical Sequence Programmer makes available easily selected, fully automatic work cycles for volume production of precision pieces.

An electronic control panel incorporates push-type selectors to preset the various operations desired for the

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REDUCING COSTS WITH—

# Buhr

## ECONOMATION

**Performs 23 operations  
every 18 seconds on  
automotive intake  
manifold!**



This Buhr 5-way dial-type hydraulic-feed Special mills, drills, countersinks and individual-lead-screw taps 206 intake manifolds an hour gross.

The Machine is equipped with a Buhr 60"-diameter 6-position automatic index table, complete with shot bolt.

Chips are disposed automatically by means of a rotating chip conveyor.

Parts are loaded one per station in each of the six single-place fixtures. Power wrench with torque-control, automatically operates clamping mechanism.

Buhr's precision manufacturing methods provide complete interchangeability of all parts and component assemblies.



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You get what you order when you order it . . . from Garrett. No waiting for late shipments. You can't beat Garrett service. No worries about Garrett . . . quality. Every Garrett washer, hose clamp, stamping or assembly is right up to the peak of quality. High quality is assured by Garrett's "statistical quality control" system.

Next time no more headaches for me. I'll order from Garrett. Why don't you do the same when you need . . .

**LOCK WASHERS  
FLAT WASHERS  
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STAMPINGS**

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particular work piece. Up to five automatic work cycles can handle as many as five spindle speeds and five feed rates. An analog to digital converter is connected to the machine's carriage motion. The converter sends electrical impulses to the control circuits at precise points in the automatic work cycles, thus actuating the various operations called for by the panel selectors.

To change the programmer, the selector settings can be changed manually; a master board can be used which will simultaneously depress the required selectors when placed in contact with the control panel; or punched cards computed by the plant methods department can be slipped over the selectors to show, through the punched holes, the exact pattern to be set for a given operation. The control cabinet is portable.

The air gage tracer used with the programmer incorporates a new dual template system. Tracer control is provided for both the last rough cut and the final finish cut. Shifting from the rough to the finish template is controlled automatically by the programmer. Automatic-positioning positive stops on the cross slide regulate rough cut depth during the automatic work cycles prior to actuation of the tracer control.

## BOOKS . . .

**DA PIGGY-BACK ROUTING GUIDE**, by H. F. Neumiller, published by Distribution Age, Chestnut and 56th Sts., Philadelphia 39, Pa. Price \$6.55. One of the biggest issues to hit the transportation industry in many years is the so-called piggy-back plan, i.e. the transportation of loaded highway trailers on railroad flat cars. The Guide, which is the first of its kind ever published in any form, lists more than 160 major shipping points between which piggy-back is available. It gives the participating railroads, lists the type of service, and gives certain rate information. Because the guide is presented in tabular form, the shipper can learn in a moment whether or not piggy-back is available between the points in which he is interested, and if such service is available, to what extent.

**BETTER FOREMANSHIP**, by Rexford Hersey, published by Chilton Co., Chestnut and Fifty-sixth Sts., Philadelphia 39, Pa. Price, \$6.95. This new and larger edition presents to foremen and higher management alike a complete package for testing, training and generally guiding foremen. It provides special working tools for foremen and supervisors—shows them how to handle these tools and how they fit in their daily jobs. Users of the first edition will notice a number of new sections in this revised version, all calculated to make it just as complete and thorough as possible. A new chapter has been added on the foreman as an interviewer. A detailed program for making foremen part of management is another valuable addition.

(Advertisement)

# Engineers!

## Join this winning team!

At DOUGLAS you'll be associated with top engineers who have designed the key airplanes and missiles on the American scene today. For example:



**DC-7 "SEVEN SEAS"** America's finest, fastest airliner



**F4D "SKYRAY"** Only carrier plane to hold world's speed record



**C-124 "GLOBEMASTER"** World's largest production transport



**NIKE** Supersonic missile selected to protect our cities



**"SKYROCKET"** First airplane to fly twice the speed of sound



**A3D "SKYWARRIOR"** Largest carrier-based bomber



**A4D "SKYHAWK"** Smallest, lightest atom bomb carrier



**B-66** Speedy, versatile jet bomber

With its airplanes bracketing the field from the largest personnel and cargo transports to the smallest combat types, and a broad variety of missiles, Douglas offers the engineer and scientist unequalled job security, and the greatest opportunity for advancement.

For further information relative to employment opportunities at the Santa Monica, El Segundo and Long Beach, California, divisions and the Tulsa, Oklahoma, division, write today to:

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C. C. LaVene, Employment Mgr.  
Engineering General Office  
3000 Ocean Park Blvd.  
Santa Monica, California



## Peace Officer *ready for war*

This man is a peace officer. His beat is the whole world, for he flies for TAC—the Tactical Air Forces of the U. S. Air Force.

Primary job of the Tactical Air Forces is to stamp out "brush fire" aggressions wherever they may occur. This is being accomplished by maintaining at combat readiness a completely self-contained striking force with a devastating nuclear punch, and a global reach.

Such a far-reaching assignment calls for versatility in men, equipment, techniques and weapons. Douglas is proud to have its planes included in the Tactical Air Command's inventory of fighters, bombers, transports and reconnaissance aircraft.



LONG-RANGE JET FOR  
TAC RECONNAISSANCE—  
DOUGLAS RB-66

## Defense is everybody's business

The Douglas RB-66 can fly 600-700 mph but not without people to pilot and service it. The Air Force needs young men and women who agree that "defense is everybody's business."

Depend on **DOUGLAS**



**First in Aviation**

# SANBORN

## OSCILLOGRAPHIC RECORDING SYSTEMS

### "ON THE JOB"

PROVIDE VALUABLE  
DYNAMIC ANALYSIS DATA



#### PRODUCTION TESTING

of components is accomplished by a Servo Component manufacturer by means of a Sanborn Single-Channel Recording System with a Sanborn Servo Monitor Preamplifier.



#### DYNAMIC PERFORMANCE

of valves when equipped with a certain pneumatic Valve Positioner is determined by the manufacturer with a Sanborn Two-Channel System and Sanborn Carrier Amplifiers.



#### ACCELERATION and TORQUE

are recorded simultaneously by an oil company in their study of fuels and lubricants as they relate to engine performance.



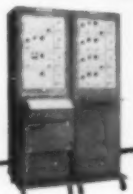
#### DRONE MISSILE

manufacturer can simulate the flight of the missile and derive information concerning its behavior under certain conditions by means of an analog computer and a Sanborn Four-Channel System with four Sanborn AC-DC Preamplifiers.



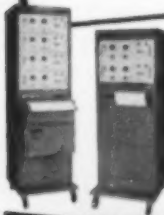
#### ATOMIC REACTOR

to be used for power generation in prototype plant is studied with the help of a Sanborn Eight-Channel System which records the output of thermocouples, strain gage pressure pickups, and resistance devices.



#### ANALOG COMPUTING

center uses Sanborn Eight-Channel Systems to record the solutions of problems having six or eight variables. Sanborn systems specially designed for this type of work utilize Dual-Channel DC Amplifiers.



#### Sanborn 150 Features include:

Inkless Recording in True Rectangular Coordinates  
Preamplifier Interchangeability  
Eleven Types of Preamplifiers  
Improved Over-all Linearity  
Accessibility of Chart During Recording

INDUSTRIAL DIVISION

## SANBORN COMPANY

CAMBRIDGE 39, MASSACHUSETTS

## BAMBOO CURTAIN

(Continued from page 104)

with the latest Soviet machinery, and all its processes are to be highly mechanized. The design is to be by Chinese engineers with the assistance of Soviet experts.

Skilled workers, technicians and administrators for the plant are now being trained in various factories, technical schools and universities, and a number are receiving special training in the Soviet Union. One hundred and seventy graduates completed the course at a Tientsin Tractor Manufacturing School in July of this year and reportedly left "to take up work waiting for them." This school was established in 1952 and now has an enrollment of over 1000 persons.

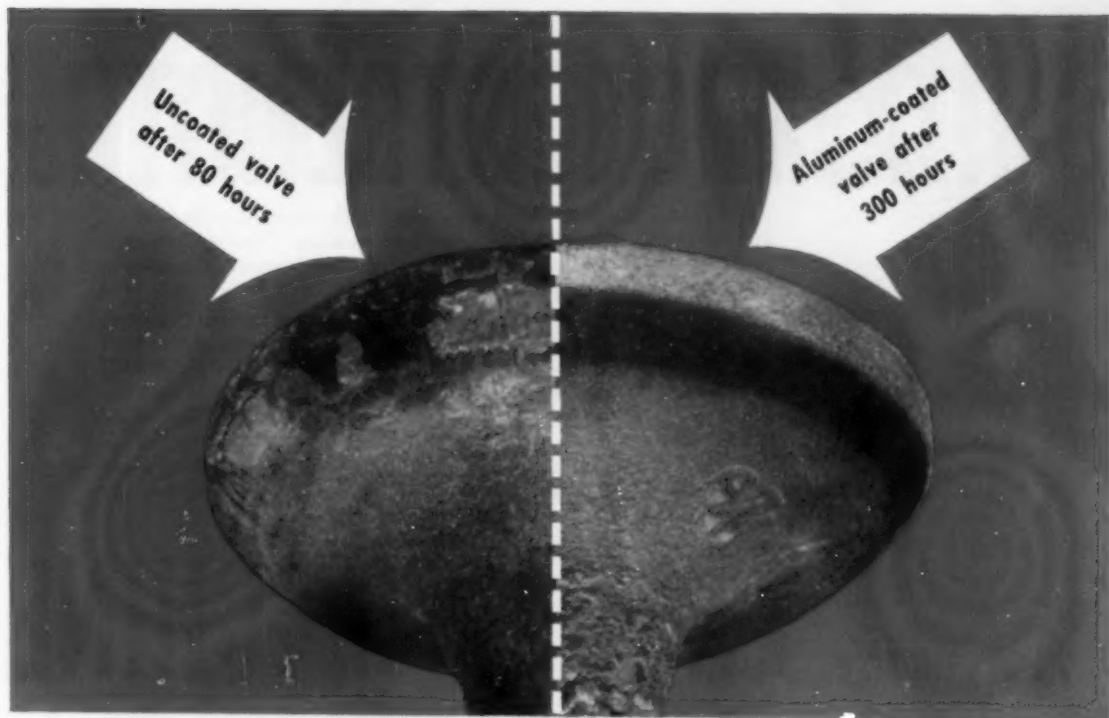
Capacity of the completed tractor plant will be 15,000 machines of 54 hp a year. Preparations are also being made during the period of the first five-year plan for construction of a second tractor plant and a harvester combine plant.

During the past two years, various Chinese spokesmen have stressed the importance of an aircraft industry to China, but there have been only the scantiest reports of progress towards this goal. It is known that the first trial flight of a machine made entirely in China took place in July of 1954. After further trials lasting two months it was announced that the aircraft had "proved excellent in performance" and that it marked "the successful beginning of China's aircraft manufacturing industry." Soviet and Czechoslovak experts are believed to be playing a major part in the development of an aircraft industry which will obviously be given a top priority by the Chinese.

## BOOKS...

200 MILES UP, by J. Gordon Vaeth, published by The Ronald Press Co., 15 East 26th St., New York 10, N. Y. Price, \$5.00. This new edition (second) covers the American program of high altitude flight from its beginning in 1946 with captured V-2's to the newest rockets and the most recent firings. Included is up-to-date information on atmospheric research, rocketry, and ballooning, as well as reports of rocket launchings, the methods of tracking and controlling rockets in flight, and the ways of recording data. Also discussed is the artificial satellite, its design and instrumentation, its launching and probable orbit, and its importance to atmospheric and extra-terrestrial knowledge.

# Thompson triples valve life!



## Thompson aluminum coating\* increases valve life 2, 3, even 4 times

Corrosion of exhaust and intake valves by hot gases and fuel residues can be greatly reduced by the Thompson method of aluminum coating\* the steel. Tests show that valve life can be increased as much as 186%, and that engine performance is kept at near-original level longer.

The Thompson method of aluminum coating provides penetration of the valve steel by the aluminum for maximum corrosion protection of the valve face.

Ask your Thompson sales-engineer for the complete story and engineering data on this newest Thompson system of aluminum coating engine valves. Or write to:

\*Processed under license by General Motors Corporation



**Valve Division Thompson Products, Inc.**

DEPT. VG-1255, 1455 EAST 185th ST. • CLEVELAND 10, OHIO

*another revolutionary development by La Salle*

# THE NEW

*... gives*

## HIGH STRENGTH...

"FATIGUE-PROOF" steel bars offer high strength in-the-bar . . without the expense and trouble of heat treating. Tensile strength is in the 140,000 to 150,000 p. s. i. range . . hardness which is related to this strength level is approximately 30 Rockwell "C."

"FATIGUE-PROOF" has uniform strength across the bar . . no soft centers. (This uniformity is maintained from bar to bar . . lot to lot.) This remarkable uniformity of strength makes "FATIGUE-PROOF" ideal for applications in the 140,000 to 150,000 p. s. i. range that formerly required heat treated carbon and alloy steels, either hot rolled or cold drawn.

With "FATIGUE-PROOF" you'll get the advantages of heat treating . . none of the disadvantages. In short, you'll get a better part at lower cost.

*... yet it's*

## EASY TO MACHINE

"FATIGUE-PROOF" is a free-machining steel bar . . without question. It machines at least 25% faster than annealed alloys . . 50% to 100% faster than heat treated alloys.

"FATIGUE-PROOF's" excellent machinability permits faster speeds, heavier feeds, better tool life . . your production rates will increase . . you'll get more parts per hour.

Distortion from machining is held to a minimum . . there is no reduction of tool life due to the higher speeds and heavier feeds . . and surface finish is greatly improved.



# La Salle STEEL CO.

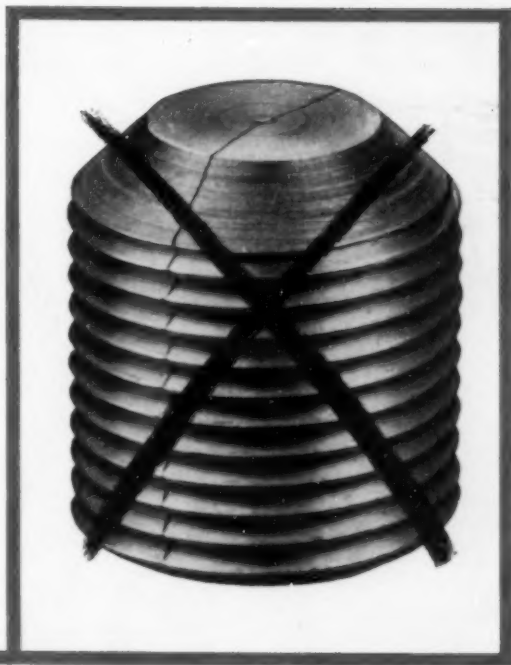
1438 150th Street, Hammond, Indiana

Manufacturers of America's Most Complete Line  
of Quality Cold-Finished Steel Bars

# **fatigue-proof**

## **STEEL BAR**

# **WITHOUT HEAT TREATING**



- *no quench cracks*
- *no distortion from heat treating*

With heat treating eliminated, the problems that accompany heat treating are avoided. Quench cracks become a thing of the past. Distortion and warpage from heat treating don't occur . . . consequently time consuming and costly straightening and cleaning operations are not necessary.

You eliminate not only the cost of heat treating but also its disadvantages.

If you have parts where strength is a requirement . . . you can save money and get away from problems by using "FATIGUE-PROOF." Our Sales Engineers will be happy to show you how this can be accomplished and provide samples for test purposes.



**JUST PUBLISHED!** Ask for your copy of the new 20-page booklet which gives additional information on the remarkable new "FATIGUE-PROOF."

### **LA SALLE STEEL CO.**

1438 150th Street  
Hammond, Indiana

*Please send me your "FATIGUE-PROOF" Bulletin.*

Name   
Title   
Company   
Address   
City  Zone  State

## METALS

(Continued from page 98)

in November, and December, but it won't be cheap metal. This nickel was destined for the national stockpile, and comes from high cost producers who were given contracts to expand their facilities and promised a higher price to compensate for higher production costs.

It will cost users about 90 cents to \$1 per lb, in contrast with the official

price of 64½ cents. However, there's little doubt it will be taken gratefully by consumers who otherwise must pay about \$2-\$2.50 per lb for imported nickel. The new diversion will bring up to nearly 24 million lb the total amount of nickel diverted to industry in 1955 from the stockpile.

### More Aluminum To Be Available

Aluminum is still in tight supply but consumers can anticipate measurable relief ahead. The Government has made more metal available to in-

dustry for the rest of this year and for the first half of 1956 by announcing that it will not call on primary producers for aluminum because more metal is being produced than was earlier anticipated. It notes that the goal of 1,746,000 tons by the end of 1955 has been exceeded.

The Office of Defense Mobilization further noted that it has extended until April 30 its deadline for delivery of 25,000 tons originally called for in the current fourth quarter.

### Copper Strengthens

The unpredictable London copper market after declining severely found new strength on reports of labor unrest in Chile and Rhodesia and advanced by mid-November to about 46½ cents per lb. In New York demand continued strong with producers selling all their output at the official 43 cent level while custom smelters hiked their price to 45-46 cents. At the same time the scrap copper price advanced to 38 cents, equal to about 43½ cents for metal to be available three months hence.

### High Grade Zinc Advanced

In spite of inability of certain zinc producers to advance the price of Prime Western metal above 13 cents per lb, there has been no difficulty in pushing up Special High Grade metal, used by the diecasters, to a premium of 1.75 cents, formerly 1½ cents, over the price for Prime Western at East St. Louis. This brand of zinc has been in short supply all year, and accounts for nearly 50 per cent of all the refined zinc consumed.

October zinc statistics revealed that production of 89,462 tons was the highest of the year.

### Ford New Facilities

(Continued from page 65)

of circulating monorail conveyors, which if extended in a straight line would be approximately two miles long, move the steel stampings through the plant. Industrial tow trucks and fork lift trucks are used to handle stock in the more than 200,000 sq. ft of storage space in the plant.

There are approximately 450 checking fixtures and gages used by the inspection section of the stamping plant's quality control department. They gage individual body parts during manufacture as a constant check on production processes and quality.

# now

you can increase the  
service life of your  
production tools  
and your  
production parts



300%  
to  
1000%

#### PRECISION HARD CHROME PLATING BY THE FAMOUS MOREY PROCESS

You can deposit hard chrome within precision tolerances of .0001". Such positive control eliminates costly finish grinding operations.

#### COMPLETE SELF-CONTAINED UNITS FOR USE IN YOUR PLANT

You can have a complete, self-contained unit delivered, that will handle any quantity of parts, ready for immediate connection to power lines, water and drain.

#### SPECIALY ENGINEERED FIXTURES AND RACKS REDUCE COSTS

Special fixtures and racks are engineered to eliminate time-consuming masking by lacquers and waxes. (Normally 80% of the cost).

#### OFFERS SUPERIOR THROWING POWER AND IDENTICAL DUPLICATION

You can plate grooves, shoulders, etc., and, at the same time, maintain the exact original form and finish—with sharp, clean corners.

#### EQUIPMENT IS FULLY INTEGRATED ON STANDARD AND CUSTOM MODELS

Equipment on each model is fully integrated, —with tank size, power, location of anodes, and all other components properly related.

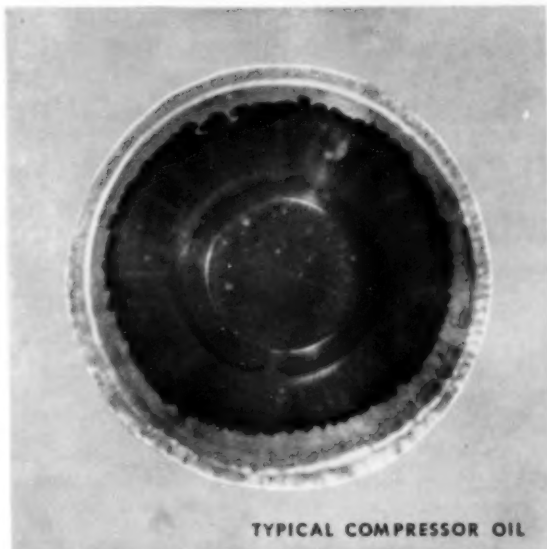
#### COMPREHENSIVE TRAINING COURSE AT OUR PLANT IS FREE

We offer a comprehensive training course, to instruct your operator in all phases of precision plating, on your type of work—free.

Write for descriptive literature

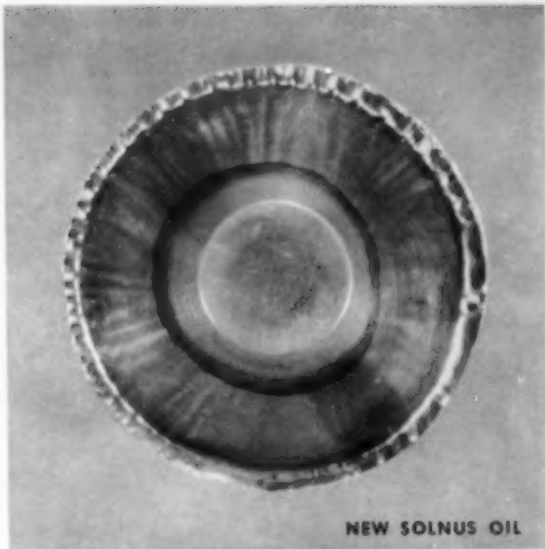
## CHROME ELECTRO-FORMING CO.

"Precision Plating Requires No After Grind"  
Exclusive Licensee of Morey Process • 7515 Lyndon, Detroit 21, Mich.



TYPICAL COMPRESSOR OIL

To demonstrate the comparative deposit-forming tendencies of compressor oils, two drops of a typical compressor oil were heated until evaporated. Notice



NEW SOLNUS OIL

the large deposit, *most of which is carbon*, left by the typical compressor oil. A new Solnus oil, after the same evaporation test, leaves a much smaller deposit.

# NEW SOLNUS OILS HELP KEEP COMPRESSORS CARBON-FREE



THREE MINUTE TEST right at your desk shows why Solnus oils are the best for your compressors.

The chief enemy of air compressors is carbon build-up. The best way to avoid this hazard is to use the compressor oil that has the lowest carbon-forming tendency.

Sun's new Solnus oils have been proved to be ideal compressor lubricants. The minute amounts of carbon that form are fluffy and blow away easily . . .

assurance against dangerous build-up of carbon on valves and exhaust ports. Tear-downs for cleaning are kept to a minimum.

We'd like to show you, right on your desk top, the dramatic test pictured above. Ask your Sun representative about it the next time he calls or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. SI.

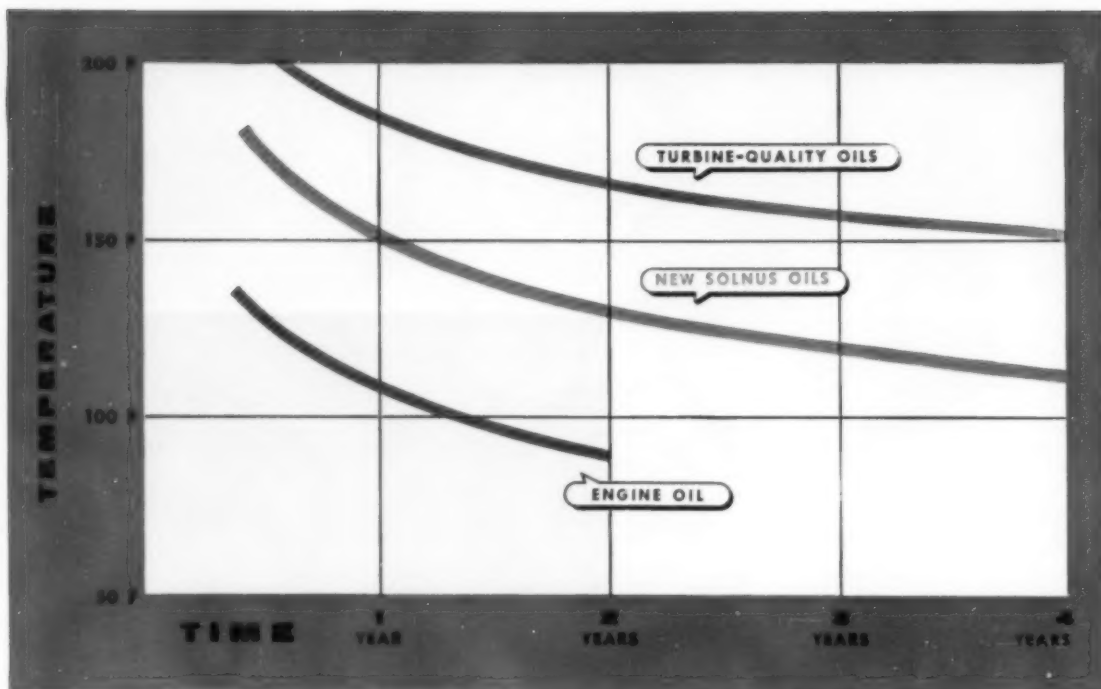
Please turn to the next page



INDUSTRIAL PRODUCTS DEPARTMENT

**SUN OIL COMPANY** PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL



This graph is based on 10% make-up per year and a 40-hour week.  
The yellow area represents approximately 80% of all applications.

## NEW SOLNUS OILS IDEAL LUBRICANTS FOR 80% OF ALL APPLICATIONS

High grade lubricants for squirt-can prices . . .  
New Solnus oils give more lubrication per dollar

The lubricated parts of most machines—our estimate is 80%—operate at temperatures below 130 F and the time between oil changes is less than 2 years. New Solnus oils were specifically developed to meet these operating conditions at the lowest possible cost.

The above graph compares the service life of new Solnus oils with that of an expensive, turbine-quality oil, and an oil of the type old-timers call "engine oil". The service life of the turbine-quality oil is excellent and probably covers 99% of all applications . . . but for a premium price! The engine oil has a very limited life. It cannot be used

safely, except for a very short time, at even moderately high operating temperatures, and it gives very little protection against rust and corrosion.

Now look at the service life of new Solnus oils. They easily meet the service requirements of at least 80% of all oil lubrication jobs and they sell for a squirt-can price! In addition, new Solnus oils are fortified to prevent both rust and oxidation . . . a feature usually found only in more expensive oils.

For the full story on new Solnus oils, see your Sun representative or write Sun Oil Company, Philadelphia 3, Pa., Dept. SI.



INDUSTRIAL PRODUCTS DEPARTMENT

# SUN OIL COMPANY

PHILADELPHIA 3, PA.

In Canada: Sun Oil Company, Ltd., Toronto and Montreal

## Rambler OHV Engine

(Continued from page 61)

from the use of deep coil springs on all four wheels and the addition of a front suspension cross-member mounted in rubber to the body sills. Lower control arms are mounted to the cross-member. The new suspension permits widening the front tread by more than three inches. The rear tread is five inches wider than in 1955.

Seven models are available in four basic body styles — four-door sedan, four-door hardtop, four-door Cross Country station wagon, and four-door hardtop convertible station wagon.

There is an increase of almost 50 per cent in effective braking area. Brake and clutch pedals are of the suspended type, and the brake master cylinder is located on the firewall in a readily accessible position. Power brakes are standard equipment on all '56 Rambler custom models, and are available at extra cost on all other models. The power brake system is the Treadle-Vac type, permitting 25 per cent faster braking with 40 per cent less effort. Power steering of the direct linkage type is optional for the first time on Rambler models.

Cooling capacity of the optional Rambler air-conditioning system has been improved in line with the increased requirements of the larger interior. The unit incorporates the heater, and all major components are located forward of the instrument panel.

The 1956 models offer a choice of three transmissions: standard, standard with overdrive, and Dual-Range Hydra-Matic.

The Rambler is sold by both Nash and Hudson dealers.

## Hudson New V-8 Engine

(Continued from page 60)

missions. Ignition key starting is used on all other models.

A prominent styling feature of the 1956 Hudson line is the new V-shaped grille highlighted by an inner mesh pattern. The die-cast grille is integrated with new chrome headlight rings. The front fender appearance is enhanced by ornamental "air intake scoops," giving them a modern, long look.

All Hudson models utilize new squeeze-type safety door handles, eliminating hazardous protrusions.

V-line interiors are completely new, featuring a new dash panel and new harmonizing selections of interior colors.

The rear view of the 1956 models has a completely new look. The new tail-lights, elliptical in shape, blend into the fender with new chrome fins. A new rear deck ornament, handle and key lock round out its new appearance.

Front wheel brakes of the 1956 Wasp have been increased to 165 sq in. The Hudson Triple-Safe brake feature is standard on all models not equipped with power brakes.

"Airliner reclining seats" and con-

vertible twin bed combination are standard on all Hudson custom models and optional on super models.

Power assists, such as power steering, power brakes and power-lift windows, are available on all models as optional extra cost equipment.

The All-Season air conditioning system is offered an extra cost optional equipment on both models. It combines refrigerating, heating and ventilating into one integrated unit, operated by a single temperature control knob. The "Weather Eye" heating and ventilating system also is offered as optional equipment on the new models.

## Highest Precision

## HARDENED & GROUND PARTS

THE ball stud shown here is a perfect example of the precision methods and quality material that go into the production of all Brown Hardened and Ground Parts. Twelve separate operations are employed to produce this vital part. Every feature about this ball stud has to be right—every feature is. It has strength, wear resistance, precision fit, true-ground spherical and tapered surfaces, close inspection and strict uniformity.

Brown Hardened and Ground Parts have been serving the automotive industry for over 40 years. We refer you to any of our long list of satisfied customers. For information pertaining to your own requirements, simply write or wire.

Henry W. Brown  
PRESIDENT



Parts include:  
King Pins  
Shackle Bolts  
Shackle Pins  
Brake Anchor Bolts  
Countershafts  
Idler Shafts  
Stub Axle Shafts  
Steering Ball Bolts  
Beam Bolts and Bolts  
Str-Wheel Rocker Shafts  
Wheel Studs  
Water Pump Shafts  
... anything in the hardened and ground line, of any analysis steel, up to 4 1/2" diameter.

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SYRACUSE, N. Y.

C. H. Eider, 2407 Cleveland Rd., Cleveland • H. F. Spring, 4719 Main St., Detroit • R. C. Anderson, 5851 N. Ashland Ave., Chicago • Henry J. Winemiller, 1724 Carlton, Fort Worth • Lyle H. Johnson, 1248 Woodward Blvd., Los Angeles, Calif. • John B. Mould, 3011 S.E. Vanhook St., Portland, Ore.

**A lifetime of savings in  
maintenance and repair  
with the ALL-STAINLESS STEEL  
Volume Van!**



The Freuhauf Stainless Steel VOLUME VAN was designed by the Budd Company, Philadelphia, Pa. Component sections are shipped to Freuhauf for assembly. The VOLUME VAN utilizes 94" of usable space out of a possible 96" of legal outside width. Length inside is only 4 1/4" less than over-all length.

High . . . wide . . . and handsome is Freuhauf's Stainless Steel VOLUME VAN . . . built to last a lifetime with durable stainless steel that's tough . . . cleans easily . . . wears brighter with age.

Thanks to stainless—every ounce of excess weight engineered out! Thanks to stainless—every ounce of needed strength engineered in to give the VOLUME VAN the highest capacity per length, per height of any trailer made . . . to make it the greatest profit-making unit ever built.

Stainless steel's corrosion resistance makes it possible to haul meat, produce, frozen foods and other perishables. Handling of acids, salts and chemicals are all in a day's work with stainless, too. No wonder it has won over the trailer industry. Its good looks, strength, light weight and sanitary appeal will win you over, too.

Contact your suppliers for full particulars.



**VANADIUM CORPORATION  
OF AMERICA**

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Producers of alloys, metals and chemicals

*Here's How*

# GITS

*Helps Give*

## Built-In Low Cost To YOUR Equipment



**OIL  
CUPS**

Accurately machined from a solid brass one-piece forging, this oil cup permits safe, dependable application of lubricant at very low cost. Used widely on motors and small machinery requiring side oiling. Style L—No. 1202.



**SIGHT  
GRAVITY  
FEED  
OILERS**

Rate of oil flow regulated by needle valve, directly observed through sight glass in stem.

Shut-off knob does not affect needle valve adjustment. Visible oil supply. Non-breakable. Tops in convenience and dependability, at low cost. Style NFU—No. 3602-A.



**OIL HOLE  
COVERS**

This model is designed to fit into a simple drilled hole. Ideal for use on small motors, generators, starters and light machinery—for dependable oil hole protection at moderate cost. Larger sizes frequently used as filler caps on tanks or reservoirs. Style R—No. 305.



**GEAR  
CASE  
GAUGES**

This oil gauge plug permits instant checking of oil level within a transmission or gear case. For use where construction permits insertion in tapped hole. A valuable addition to any such equipment—at very low cost. Style BW—No. 4042.



**SIGHT  
GRAVITY  
FEED  
MULTIPLE  
OILERS**

This one unit replaces 3 to 8 individual oilers. Maximum practicality in a small central lubrication system. Positive cut-off during idle periods. Individual vibration-proof needle valve adjustments. With solenoid control (Illustrated): Style MDS—No. 4685-A. Without solenoid: Style MD.



**SIGHT GAUGES**

For use where rate of oil flow must be regulated to suit changing operating conditions.

Needle valve permits extremely accurate adjustment of oil feed.

Sight glass provides direct observation of rate of oil flow. Accuracy and convenience at a moderate price. Style PF—No. 4290.

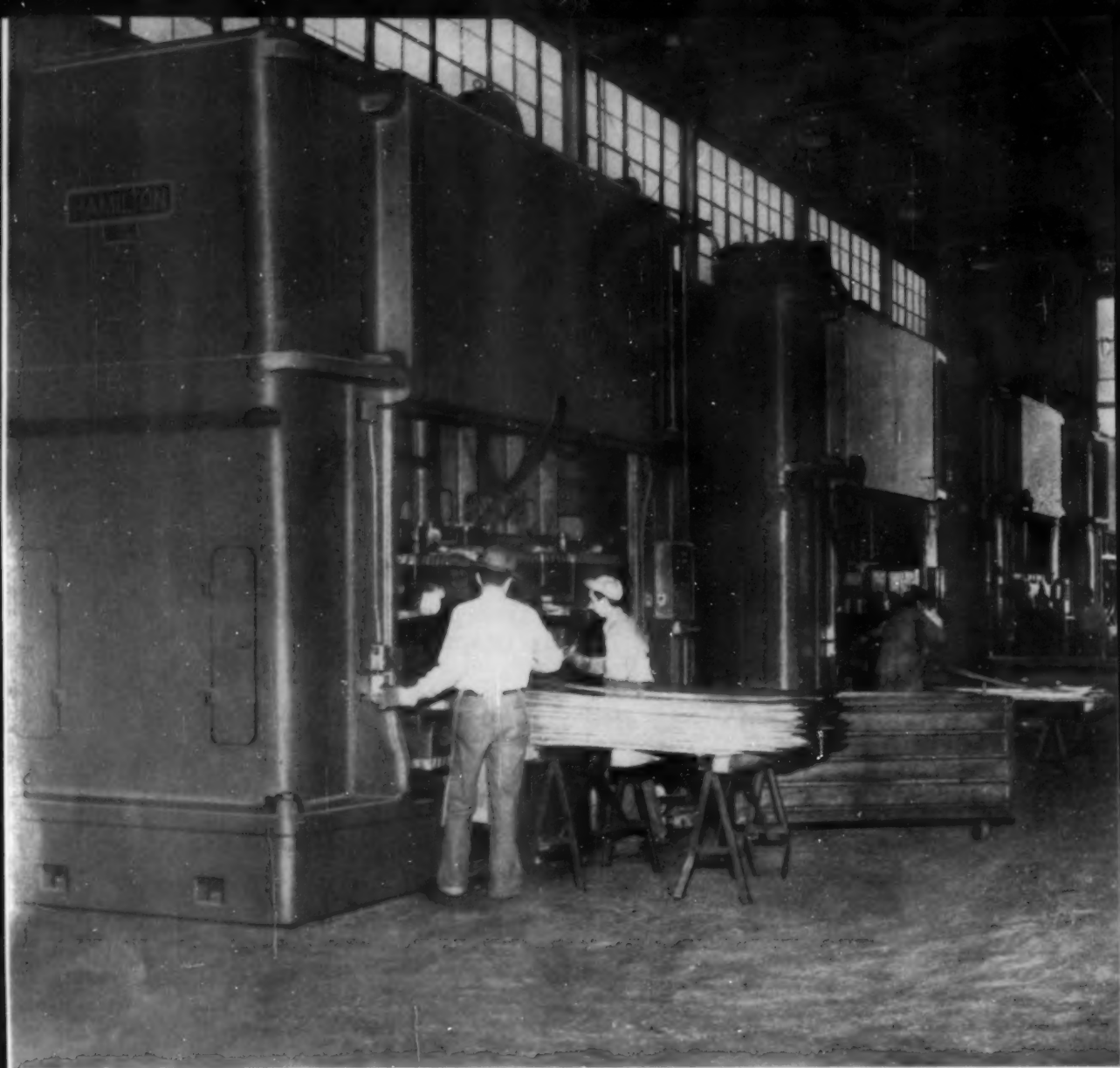
Don't price yourself out of the market. When you design proper lubrication into your equipment, specify GITS Lubricating Devices—the widest selection available anywhere. The items pictured above are only a few of our many thousands of lubricating devices. At the design stage, get the GITS story. Free Engineering Service. Send NOW for your free Catalog.

**GITS BROS. MFG. CO.**

*The Standard For Industry For Almost Half A Century*

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Chicago 23, Illinois

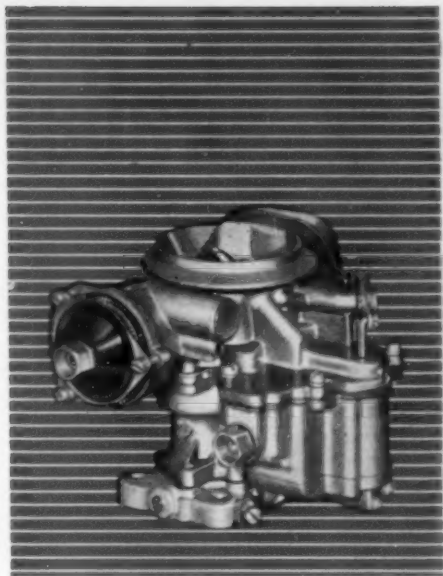
*Clip this page for handy "rough reference"*



**PROOF OF PERFORMANCE**—Hamilton presses from 100 to 4000 tons have proved their superiority in design and performance. That's why *several thousand* now are helping set production records in many *small* stamping plants as well as the *largest* auto-body stamping plants. Let Hamilton's engineering skill answer your new press requirements. Hamilton Press Division, Baldwin-Lima-Hamilton Corporation, Hamilton, Ohio.



**Hamilton Press Division**  
**BALDWIN-LIMA-HAMILTON**



# Foremost in **ECONOMY**

# **STROMBERG**

AMERICA'S FINEST

# **CARBURETOR**

Economy is a magic word in the automobile business. Economy of operation is a mighty sales clincher in any dealer's showroom. Economy in manufacture is vital to protect the narrow profit margin of the auto maker. *The Stromberg Carburetor offers you both.*

Stromberg's system of consistent fuel metering results in economy of operation unmatched by any other carburetor. Automotive experts know it. Fuel consumption statistics prove it. And two consecutive victories for Stromberg-equipped cars in the famed Mobilgas Economy Run confirm it.

But Stromberg can mean even more as an economy factor for the manufacturer. Because of the vast number of different carburetor models which Stromberg makes available to manufacturers, a Stromberg Carburetor can usually be selected to fit the needs of any engine with a minimum of costly revisions.

For more than forty years, Stromberg has been the American



For two consecutive years, the grueling Mobilgas Economy Run has been won by a STROMBERG-equipped Studebaker.

leader in every phase of carburetion. More advances in this field have been initiated by Stromberg than by any other manufacturer.

The folks who make Stromberg Carburetors enjoy tackling a difficult problem—because when you have a problem we can solve, everyone is happy. You have a better product, we have a satisfied customer, and the motorist has a more efficient automobile.

Call on us. The Stromberg application engineer is at your service. You'll find he knows his business—and he may help build yours.

#### ECLIPSE MACHINE DIVISION OF BENDIX AVIATION CORPORATION

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Stromberg® Carburetor

Bendix® Electric Fuel Pump

Bendix® Pole-Thru Starter Drive

\*REG. U. S. PAT. OFF.



The STROMBERG application engineer will be happy to discuss carburetion problems with you at your convenience.



**ECLIPSE  
MACHINE  
DIVISION**

# How Schrader



Schrader Valve Core gives extra protection—long core with stainless steel spring at bottom inflates easily—self cleaning seat. Positive seal means safety.

**REPLACEABLE  
VALVE CORE  
SEALS AIR IN  
SIMPLIFIES  
INFLATION**

Interchangeable  
in various  
standard valves

**NEWEST  
TUBELESS  
TRUCK TIRE  
VALVES**

Schrader TR 500 Series  
CLAMP-IN TRUCK TUBE-  
LESS TIRE VALVES—latest,  
most modern.



Schrader Caps seal valves for better tire performance—dirt and moisture can't get in—air can't get out. Special rubber washer reinforced with two brass plates assures perfect swivel-seal.

**SEALED VALVES  
MEAN BETTER TIRE  
PERFORMANCE**



**GAUGING  
PROTECTS TIRES.  
INCREASES  
MILEAGE**

Schrader gauging protects tires. Gauges for every use—from pocket gauge to master gauge, keep air lines "certified" accurate, tire properly inflated. Tires properly inflated deliver all the mileage built in.

## Schrader®

ESTABLISHED IN 1844

# helps protect your product at the customer level



Schrader Chuck Gauge—new unit with replaceable gauge cartridge simplifies inflating, deflating for dealer. Accurate air service keeps tires rolling better, safer.

**INFLATING—DEFLATING  
SIMPLIFIED FOR DEALER**



Schrader Service Tools make dealer valve service easy—whether on tubeless or conventional tires.

**SIMPLIFIED  
TOOLS  
MAKE TIRE  
AND TUBE  
REPAIRS EASY**

## Schrader tire valve and air service products for dealer use promote tire safety, economy.

You make certain that mileage, safety, economy are built into your equipment tires. Through your dealers, through service stations, through garages—all over the world—your product is serviced. In order to do this job—the serviceman needs the right tools, the right replacement parts, the "how-to" information, to match the quality of your product. That's why Schrader, as the leading air products supplier to the Tire and Rim Industry works with the tire manufacturer in designing valves to meet the Industry's specific needs. And Schrader specializes in providing the tools, the parts, the information to dealers all over the world. These Schrader quality products are stocked and sold wherever your tire goes.

And more important—the world-wide service is possible because of the tire inflation principle developed by Schrader over 50 years ago—which still stands today! Every device, every Schrader Valve, Valve Core, Valve Cap is immediately, easily interchangeable anywhere in the world.

If you'd like to see the latest Schrader Air Products Service Manual—write for Manual A-100. A. Schrader's Son, Division of Scovill Manufacturing Company, Incorporated, 470 Vanderbilt Avenue, Brooklyn 38, N. Y.



**FIRST NAME IN TIRE VALVES**

**FOR ORIGINAL EQUIPMENT AND REPLACEMENT**

# How Aluminum parts



For better parts at lower cost . . .

# help Ford cut costs

THE Ford Motor Company recently changed its specifications on the Ford car windshield wiper knob insert to aluminum. This Ford part is one of several new screw machine parts now made from aluminum. They are currently

studying other screw machine parts for possible conversion to aluminum.

This conversion met the requirements of management, design engineering and production groups.

## Management requirement: Savings

**Change to aluminum saved approximately 24.8%.** Ford management is always interested in materials or methods that will effect savings with no sacrifice in quality. In this particular case, as in others, aluminum was selected because

it provided savings of about 24.8% per piece, including scrap loss. Also, the aluminum parts are so much lighter than the previously used metal, that Ford has realized additional savings in shipping costs.

## Designer requirement: Performance

**Aluminum met design specifications.** Ford engineers selected aluminum alloy 2011-T3,  $\frac{3}{8}$ " round stock after they tested other metals and found that the aluminum knob insert would not only provide sufficient strength but would

also take a slightly better knurl. The fact that aluminum satisfied performance requirements and for less money than other metals tested, was the main consideration in Ford's selection of aluminum.

## Operator requirement: Machinability

**Aluminum machined at maximum efficient cutting speed.** The changeover to aluminum for this knob insert did not require any change in machining speed and setting from the previous metal used. Ford is running the part successfully at the maximum efficient speed of the automatic screw machine. And Ford found that it was not even necessary to change the angle of the form tool, which is an ordinary high speed steel tool with no chip-breaker.

The experience and engineering know-how of Ford has proved that properly designed aluminum parts can often provide substantial economies plus high quality.

### You get these big advantages with aluminum

Each part costs less because you get *three times* as many parts from a pound of Kaiser Aluminum screw machine stock as you get from a pound of brass or steel. And these parts give you a unique combination of advantages, including lightness with strength, handsome finish, corrosion resistance, good heat and electrical conductivity.

Because of economy, plus these other advantages, we pre-

dict that hundreds of aluminum screw machine parts will soon become standard in American motor cars; for example, heater fan hubs, master brake cylinder pistons, door lock buttons, tire valves and spark plug terminals, compression fittings for gas and oil lines, hood release cable stops.

Our engineers will be glad to examine the screw machine parts now being used in your production to see how you can effect substantial savings by specifying them in Kaiser Aluminum.

Also, if you need assistance in finishing, welding, forging, roll-forming, extrusions, stampings, castings—or desire any type of engineering service and fabricating counsel—our development engineers will gladly provide it.

We may be able to suggest modifications in your designs, new fabrication techniques, changes in aluminum alloys—all of which may give you a better product at lower cost.

For immediate service, contact Kaiser Aluminum & Chemical Sales, Inc. *General Sales Office*, Palmolive Building, Chicago 11, Illinois. *Executive Office*, Kaiser Building, Oakland 12, California.

think of **Kaiser Aluminum**



When you want close quality control,  
you use Bonderite under the paint.



"GOLD STANDARD" PANELS are Bonderized Parker's Customer Service lab prepares Bonderite-treated panels, used as the standard of comparison by manufacturers and paint companies. We have shipped about 400,000 in the last 12 months.

● The test panels in the plant laboratory tell the story: Bonderite in the finish line is the quality control engineer's friend. Performance standards are more easily maintained. And when standards are maintained in the plant, product performance in the field will please your customers.

The secret of Bonderite's uniform results begins in Parker manufacturing plants, where each lot of chemical is numbered and tested. A sample

is kept permanently. Operating procedures for processing are simple, easily followed, easily checked. Long experience has smoothed out all the kinks!

Take the most positive way to control quality and assure finest paint finish, durability and appearance—use Bonderite.

\*Bonderite, Bonderlube, Parco, Parco Lubrite, Parker Pre-Namel—Reg. U.S. Pat. Off.

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wear resistant for friction  
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**TROPICAL**  
heavy duty maintenance  
paints since 1883





ENGINEERING  
REPORTS:



#### SYSTEM-ENGINEERED METAL-CLAD

## G-E switchgear guards power continuity

G-E metal-clad switchgear is engineered to provide the maximum protection against power shutdowns which production line operation demands. As automotive processing becomes more and more continuous, you require greater assurance against power interruptions.

Metal-clad switchgear is engineered by G.E. to exceed the most rugged duty requirements in factory pre-assembled units that are easy to install and maintain. The complete line includes light-duty metal-clad up to 50 MVA and 4.16 kv; heavy-duty metal-clad up to 13.8 kv—with advanced-design magne-blast circuit breakers.

G-E engineering know-how is available to you *in the planning stage* to help you select your power equipment not only for present needs, but also for the predicted expansion of the industry.

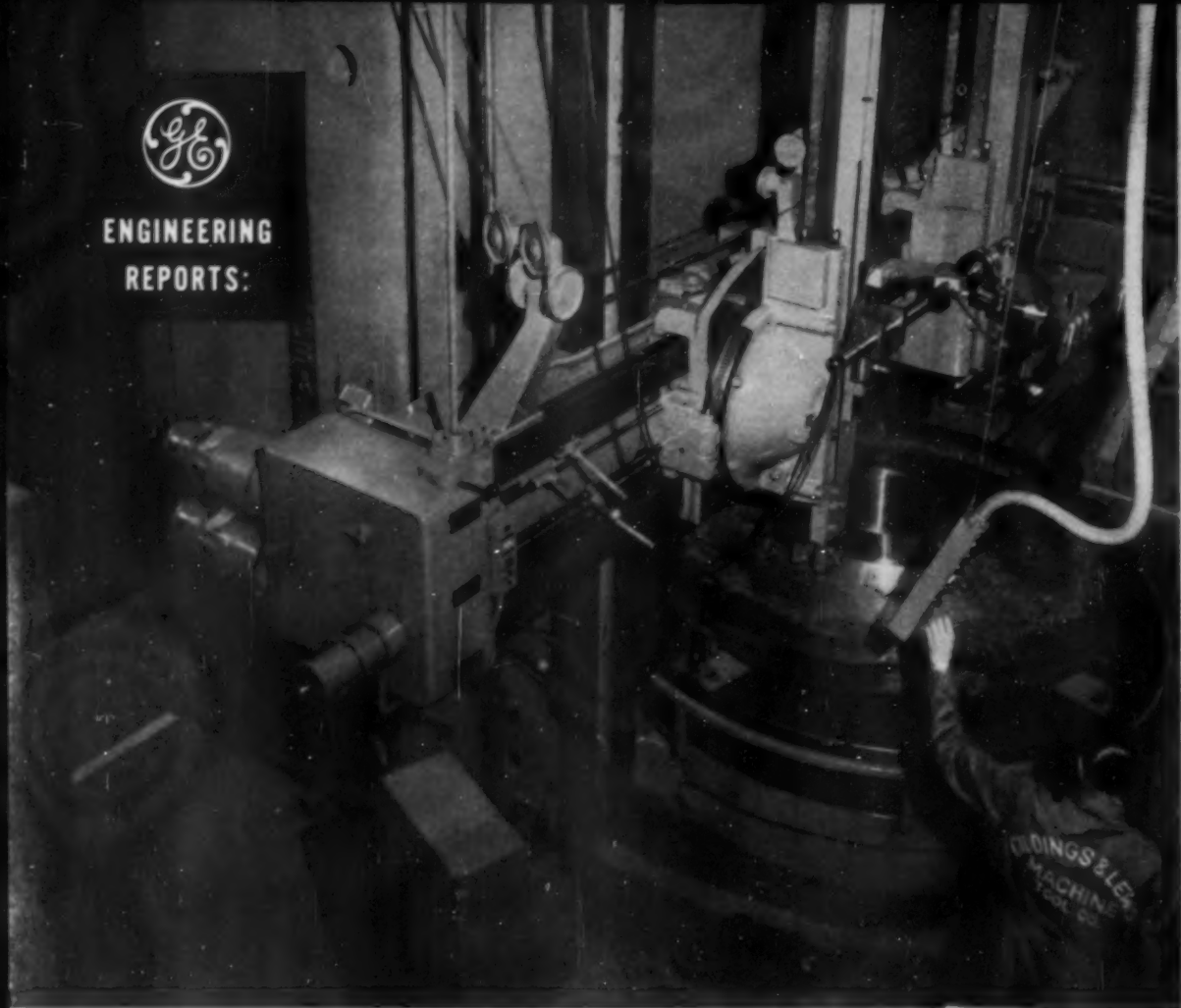
The up-to-the-minute production machinery described on the following pages will illustrate your need for planned power.

TURN PAGE FOR SYSTEM STORY . . . ►

GENERAL  ELECTRIC



ENGINEERING  
REPORTS:



**SYSTEM-ENGINEERED . . .**

## G-E devices power and control new production

G-E engineering know-how helped co-ordinate the electrification of this Giddings and Lewis 8-foot vertical boring mill which can save up to 47% machining time with improved surface finish. Recently exhibited at the Machine Tool Show in Chicago, the G-E drive provides electronic two-dimensional-tracing, constant surface cutting speed as the diameter of the work changes, and maintains constant chip thickness. All these operations are obtained simultaneously.

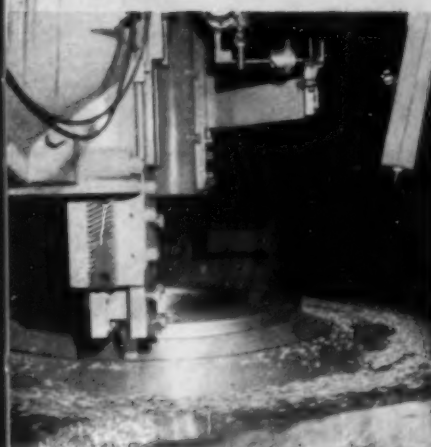
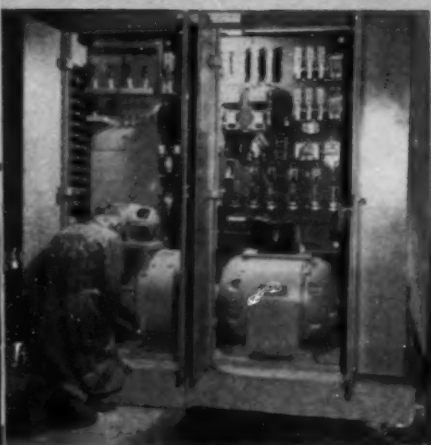
G-E's two-dimension tracer head controls the ram and saddle motions. Each of these motions has a 1½-hp d-c motor, amplidyne-generator feed drive which permits the cutting tool to move completely around the work (360° profiling) in any pattern dictated by the template.

A G-E 75-hp electronic Speed Variator drives the main table. A potentiometer sensing element mounted on the left rail head sends signals to the Speed Variator. This maintains constant surface cutting speed over a 20:1 range of work diameters.

The tracing speed of the left rail head is automatically adjusted by another control system so that constant chip thickness is assured when the table speed is changed manually or by the constant cutting speed control.

Similar G-E engineering service is available to you and your machine tool builders to help make your processing more continuous, productive and profitable. For details of these systems, write for bulletin GEA-6122, G-E Tracer Control, and GEA-6127, Speed Variators.

GENERAL  ELECTRIC



G-E ENGINEERS helped plan electrification of Giddings & Lewis boring mill. Speed Variator, above, maintains constant speed of table. (Lower photo.)

# machines

**BENEFIT FROM G-E PRODUCT ENGINEERING . . .**

## Design in **TRI 55 CLAD** motors

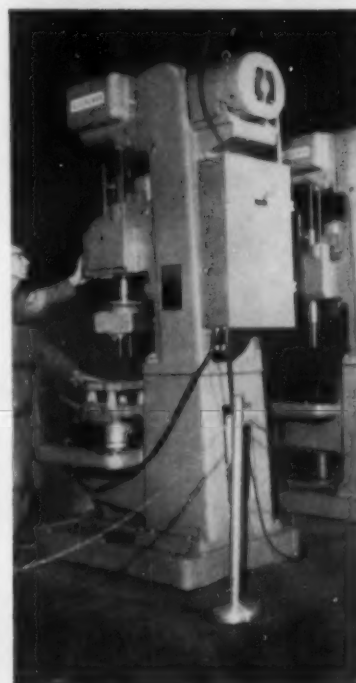
Be sure your new production machinery is equipped with Tri-Clad '55' motors. The benefits tool builders receive when they design in Tri-Clad motors are passed on to you in lighter, more compact and modern-appearing equipment. These long-life motors mean less maintenance and greater operating economy for you. These features are prompting the big "motor switchover." At the recent Machine Tool Show, for example, over 62% of the G-E motors between 1 and 30 horsepower were built to the new dimensions.

For details on how G-E Tri-Clad '55' motors will keep your production moving, write for bulletin GEA-6013.

**The Goss & DeLeeuw Machine Company** uses Tri-Clad '55' totally enclosed motors in the 1-15-hp range for the tapping, drilling and feed drives on its automatic chucking machine (upper right photo).

**The Cleareman Machine Company** exhibited its new Series A Automatic Drilling and Tapping machines powered by G-E Tri-Clad '55' motors.

**The Van Norman Company** uses G-E Tri-Clad '55' motors to drive the wheel head on this new grinder.



### CHECK COUPON BELOW FOR DESCRIPTIVE BULLETINS

**General Electric Company**  
Apparatus Sales Division  
Section A651-10  
Schenectady 5, New York

Please send me the following bulletins describing G-E products for the automotive industry:

- |   |  |
|---|--|
| <input type="checkbox"/> GEA-5664 G-E Metal-clad Switchgear | <input type="checkbox"/> GEA-6013 G-E Tri-Clad '55' Motors         |
| <input type="checkbox"/> GEA-6122 G-E Tracer Control        | <input type="checkbox"/> GEC-970A G-E Automatic Plating Rectifiers |
| <input type="checkbox"/> GEA-6127 G-E Speed Variators       |  |

Name

Company

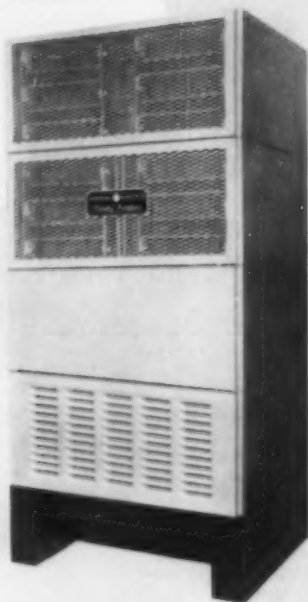
Street

City  State

**TURN PAGE FOR MORE PRODUCT HIGHLIGHTS**

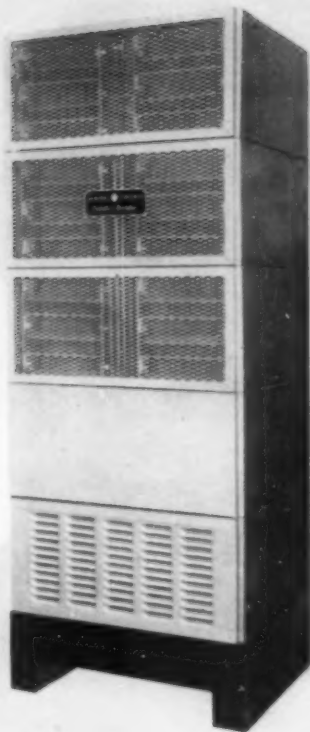
**\$1440**

12-volt,  
500-ampere  
constant  
voltage  
control.



**\$2200**

9-volt, 1500-ampere  
constant current and  
voltage control.



## Low price announced on G-E platers

You're assured of uniform plating at a new low cost with G-E automatic plating rectifiers. In addition to the units illustrated, check these manufacturer's prices on larger units: \$8860 for the 24-volt, 4000-ampere unit with automatic anodizing control; \$10,080 for the 9-volt, 10,000-ampere unit with automatic voltage control; \$8380 for the 24-volt, 3000-ampere unit with automatic anodizing control and sealed, oil-cooled stacks.

In addition to lower initial cost, these units also save operating costs in these three big areas:

- (1) **LABOR**—No one needs to stand by the controls to adjust for changes in the tank load. Plating operators can be freed for other operations.
- (2) **SPOILAGE**—Spoilage is reduced, since deposi-

tion is kept uniform by the constant current or voltage. This reduction in spoilage means fewer rejects—less re-working expense.

- (3) **MAINTENANCE**—Maintenance is kept low, because both the G-E automatic control and rectifier are mechanically static. Except for the cooling fan, there are no moving parts.

Operation is easy. The desired anodizing sequence is set up by the operator at the rectifier control panel. Once set, the sequence is completely automatic, requiring no further adjustment. Remote-control station can be conveniently located within easy reach of the operator right at the anodizing tank. Check coupon on preceding page for Bulletin GEC-970A. General Electric Company, Schenectady 5, N. Y.

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for  
the leaders  
in new  
engine design

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Detroit  
Aluminum  
and  
Brass

# ENGINE BEARINGS

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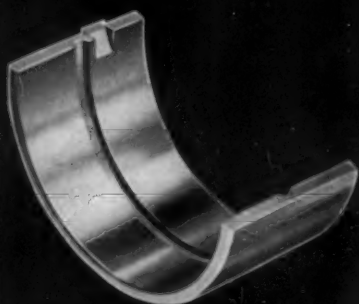
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We can meet high production needs or special requirements for bearings and bushings of every type used in original equipment.

Steel backed, copper lead and aluminum alloy-lined bearings are lead-tin overplated to customer's specifications.

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*designed for the job!*

**FINEST ALLOY  
STEEL LEAF AND  
HELPER SPRINGS**

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PRECISION  
LINE**

*Fellows*

*Gear Production Equipment*  
The Fellows Gear Shaper Company, Springfield, Vermont, U.S.A.

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**TRACKWORK of ALL KINDS**  
LIGHT RAILS—12" TO 60"—20'0" & 30'0"  
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JOINT BARS, BOLTS, TIE PLATES, SPIKES & TOOLS, FROGS, SWITCHES, STANDARD & SPECIAL TRACKWORK.


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THEY'LL PAY FOR THEMSELVES THE FIRST TIME YOU USE THEM

*New*



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**VELLUBOLTS**

PATENT PENDING

- Screw the VELLUBOLTS into the four corners of the engine bed. Snap the gasket over the bolts, then snap the pan on over the gasket and presto! . . . the pan is locked in place while you screw in the regular bolts. Then remove the VELLUBOLTS. They can be used over and over again.
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VELLUBOLTS — THEY WORK LIKE MAGIC!

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**Die's**  
STEEL RULE  
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**solves**  
**another problem by**  
**WEATHER-PROOFING**  
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Write for Bulletin 141

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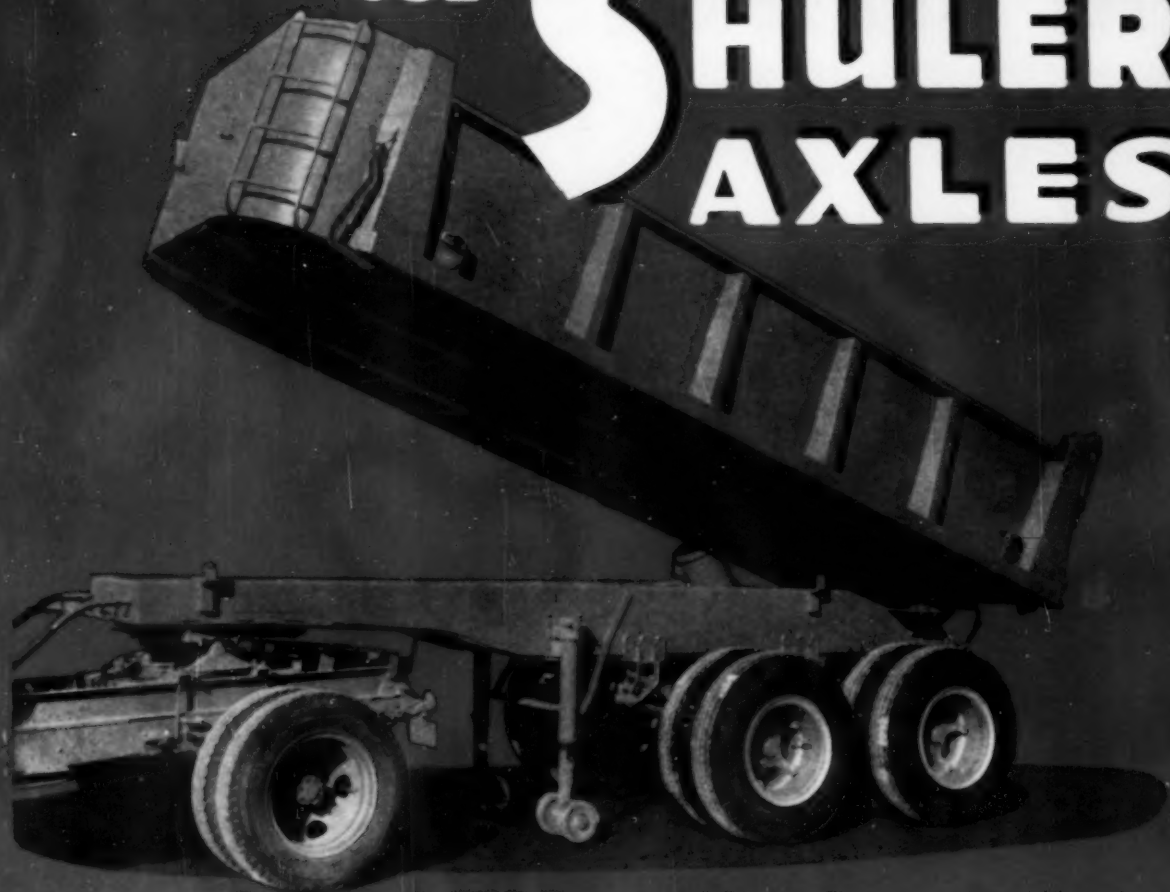
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